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ASSISTANT SECRETARY OF ARMY (RDA)  
WASHINGTON, DC 20310-0103

# ARMY SCIENCE BOARD 1988 SUMMER STUDY ARMY TESTING

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The purpose of the study was to provide the Army with an assessment of the philosophy, methodology and effectiveness of its test program and to suggest ways by which the test and evaluation process could be improved in order to assure sound test programs for the coming decade. The Army is currently suffering from the perception that its test and evaluation program is less than adequate. However, a number of improvements have been made in recent years in response to these criticisms. Implementation of the study's		

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recommendations will go a long way toward continuing the process of regaining the confidence of Congress and the American people in the total Army acquisition process.

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## **EXECUTIVE SUMMARY**

### **BACKGROUND**

The investment to acquire weapons systems and equipment requires a large allocation of the Army's resources. Weapons systems flow from a highly structured and complex development process which involves substantial interaction among users, developers, and the test community. Since past efforts of the Army in developing new weapons systems and equipment have on occasion fallen short of complete success, many studies have been and are being made to identify the problems and find solutions to improve the acquisition process.

This Army Science Board (ASB) Summer Study Panel was asked by the Assistant Secretary of the Army (RDA) to examine the quality and effectiveness of Army testing. Based on the review and analysis of the TOR, the Panel was tasked to suggest ways by which the testing and evaluation process could be improved in order to assure a sound test program for the coming decade. Additionally, the Military Deputy to the ASA(RDA) requested that the panel review selected programs to determine why the T&E efforts of some programs were more successful than others.

### **STUDY OBJECTIVES**

The TOR for this study addressed two primary objectives:

1. To provide the Army with an assessment of the philosophy, methodology, and effectiveness of its test program.
2. To suggest ways by which the T&E process could be improved in order to assure sound test programs for the coming decade.

### **ISSUES**

To satisfy this request, the Panel conducted interviews and discussions with congressional staffers, senior Office Secretary of Defense (Director of Operational Testing and Evaluation, Deputy Director of Defense Research and Engineering (T&E)) and Army (Under Secretary of the Army, Assistant Secretary Army for Research, Development and Acquisition, MilDep to ASA(RDA), Deputy Under Secretary Army for Operations Research) personnel, and Commanders/Directors of Operational Test and Evaluation Agency, U.S. Army

Test and Evaluation Command, Army Materiel Systems Analysis Agency, Combat Development Experimentation Command and with Major Subordinate Command and Program Executive Office/project office personnel. The panel received in-depth briefings on the Army's requirements and T&E process. The Panel conducted "field visits" to USAMICOM, OTEA, Headquarters, Test and Evaluation Command, and Fort Hunter-Liggett to discuss T&E planning and execution with various government and contractor T&E personnel. The Panel reviewed

T&E planning for non-development items and several major programs to identify those management practices that appear to be related to success and failure in the T&E process. Additionally, the Panel reviewed available study documentation concerning the Army's T&E program.

The study concluded with a two-week session at the National Academy of Sciences Woods Hole Study Center, Massachusetts, at which time the Panel prepared its final list of findings and recommendations.

### ISSUES

The Panel considered six principal issues:

- o Statements of operational requirements and T&E critical issues.
- o Discipline and senior-level management attention to T&E
- o The use of modeling and simulation in support of T&E
- o Improvements in the training, retention, and assignment of T&E personnel.
- o The role of the system contractors in support of T&E
- o Improvements in test facilities and instrumentation

### FINDINGS

Associated with each of the principal issue topics, the panel developed a set of findings that eventually resulted in recommendations for improving the T&E process. A partial list of these findings is as follows:

- o Army T&E is a complex process, involving many internal and external organizations.
- o Many of the observed T&E problems appear to have resulted from pressures to shortcut the process by deviating from stated Army T&E policy.
- o Other T&E difficulties often result from required operational capabilities that specify much more than essential operational requirements.
- o Conceptual experimentation is often used too little and too late in the acquisition process.
- o Failures during testing occur and should be expected, yet schedules do not allow for learning and fixing.
- o Current career development paths for T&E personnel are inadequate. Personnel turbulence in T&E hurts.
- o Computer modeling and manned simulation to support T&E are limited and not well-coordinated. They have the potential to reduce T&E costs.
- o System contractor participation in testing is essential for many systems, but has been overly restricted by Public Law 99-661. This may adversely impact future T&E costs.
- o Future testing of new systems will require instrumentation and facilities that are currently unavailable and unfunded.

#### RECOMMENDATIONS

Based on the preceding findings, the Panel prepared a set of recommendations, specifically addressing each of the six principal issue topics. A summary of the key recommendations is provided below:

- o Training and Doctrine Command focus requirements process on essential wartime operational capabilities, and make early and constructive use of conceptual experimentation.
- o The Army enforce more discipline and increase senior management contributions in implementing existing acquisition and T&E policies and procedures.



- o Deputy Chief of Staff for Personnel - Headquarters, Department of the Army develop and implement a personnel strategy that will enable the Army to attract, train, reward, and retain quality civilian and military T&E personnel.
- o The Army establish policy and improve capability for the use and scheduling of computer models and manned simulation in support of the T&E process.
- o The Army expand the use of system contractor capabilities to accelerate testing, minimize costs, and reduce facility redundancy (possibly requiring a change to PL 99-661 for Operational Testing).

The Army designate a management control point for coordination and integration of all Army T&E instrumentation requirements, applicable to multiple systems.

### CONCLUSIONS

The Army is currently suffering from the perception that its T&E program is less than adequate. Bad publicity, associated with a few programs, has led to a loss of credibility of the T&E and acquisition processes within Congress. These are facts.

However, the Army has made a number of improvements in recent years in response to these criticisms. In the Panel's opinion, the improvements have been good ones, and the overall process is, by and large, currently a good one. More remains to be done. The Panel believes that the implementation of these recommendations will be a large step toward continuing the process of regaining the confidence of Congress and the American people in the total Army acquisition process.

## STUDY OBJECTIVES

- PROVIDE AN ASSESSMENT OF THE PHILOSOPHY, METHODOLOGY AND EFFECTIVENESS OF THE ARMY'S TEST PROGRAM
- DETERMINE WHAT THE TEST PROGRAM SHOULD BE TO MEET THE ARMY'S MATERIEL ACQUISITION NEEDS FOR THE NEXT DECADE
- RECOMMEND APPROPRIATE METHODOLOGIES IN THE CONDUCT AND QUALITY OF TESTING

### **SPECIFIC TERMS OF REFERENCE**

- WHAT IS THE ARMY'S CURRENT TESTING PHILOSOPHY AND POLICY?
- WHAT IS THE ARMY'S CURRENT PROCESS FOR TEST PLANNING?
- WHAT IS THE ARMY'S CURRENT PROCESS FOR TEST PLAN IMPLEMENTATION?
- HOW ARE DATA REQUIREMENTS ESTABLISHED, AND HOW ARE TEST DATA USED IN THE DECISION PROCESS?
- WHAT SPECIFIC ACTIONS MUST THE ARMY TAKE TO ENSURE A SOUND TEST PROGRAM?

**ARMY TESTING**

**SUMMER STUDY SPONSOR**

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## APPROACH

### o BRIEFINGS AND PANEL DISCUSSIONS

- OSD
- CONGRESSIONAL STAFFERS
- HQDA

- CONTRACTORS
- MSC T&E MANAGERS
- PROGRAM MANAGERS/  
PROGRAM EXECUTIVE  
OFFICES

### o FIELD VISITS

- US ARMY MISSILE COMMAND
- AMSAA
- TRADOC (U.S. ARMY TESTING AND  
EVALUATION COMMAND)

- HQ TECOM
- OPERATIONAL TEST AND  
EVALUATION AGENCY

### o PROGRAM REVIEWS

- AQUILA
- MULTIPLE LAUNCH  
ROCKET SYSTEM
- LINE OF SIGHT-  
FORWARD-HEAVY

- M1
- BRADLEY FIGHTING  
VEHICLE SYSTEM
- HIGH MOBILITY  
MULTIPURPOSE  
WHEELED VEHICLE

- FORKLIFTS
- 9MM HANDGUN
- XM 40 GAS MASK

# MEETINGS AND SITE VISITS

PENTAGON	18-19 FEBRUARY 1988	DISCUSSIONS WITH KEY OSD/HQDA OFFICIALS AND SELECTED CONGRESSIONAL STAFFERS
US ARMY MISSILE COMMAND	15-16 MARCH 1988	DISCUSSIONS WITH PMS, PEOs AND MSC/CONTRACTOR T&E PERSONNEL
ABERDEEN PROVING GROUND	27-29 APRIL 1988	DISCUSSIONS WITH TECOM, TACTICAL ARMY COMMAND, AMSAA, AND TRADOC PERSONNEL
FT HUNTER LIGGETT	23 MAY 1988	DISCUSSIONS WITH USATEC PERSONNEL
FT ORD	24 MAY 1988	EXECUTIVE SESSION
HQ OTEA	8 JUNE 1988	BRIEFINGS BY OTEA STAFF (OPERATIONAL TESTING ISSUES/INITIATIVES)
PENTAGON	9 JUNE 1988	EXECUTIVE SESSION
US ARMY MISSILE COMMAND	20 JUNE 1988	SYSTEM ACQUISITION/TEST DOCUMENTATION REVIEW

## **BACKGROUND FOR STUDY**

### **WHY WAS THE ARMY SCIENCE BOARD ASKED TO DO THIS STUDY?**

- MAJOR RESOURCE INVESTMENT  
(TIME, MANPOWER, ORGANIZATIONS, \$)
- NUMEROUS, WELL-PUBLICIZED PROBLEMS



ARMY TIMES  
11 JANUARY 1966  
**Congress Gets Testy**

4 billion gun scrapped after failures

Weinberger  
kills DIVAD,  
writes off  
\$1.8 billion

Congressional Report Questions  
Usefulness of Military Simulations

New look  
at Bradley  
vehicle tests  
Army official cites  
swimming difficulty

Pentagon Considers Independent Testing to Assess New Weapons

Flaws are detected in Army's Beretta

New armor  
for US tanks  
may catch fire

U.S. junks  
Sgt. York  
gun project  
Weinberger cites  
Poor performance

Assessing The  
RVV's Future  
After the Crashes

DoD Demands Realistic ADATS Testing

Army Probes  
Problems With  
New Pistol

PARTIAL LIST OF PRIOR STUDIES

- 1970 - DOD BLUE RIBBON PANEL
- 1974 - ARMY MATERIEL ACQUISITION REVIEW COMMITTEE STUDY
- 1977 - OFFICE, CHIEF OF STAFF, ARMY - T&E REVIEW
- 1979 - ASB STUDY (STATISTICAL METHODOLOGIES)
- 1980 - T&E ORGANIZATIONAL STUDY (LEAD BY OFFICE DEPUTY CHIEF OF STAFF FOR MILITARY OPERATIONS AND PLANS)
- 1981 - KERWIN GROUP REVIEW
- 1985 - DIRECTOR OF MANAGEMENT, OFFICE CHIEF OF STAFF, ARMY STUDY
- 1988 - DUSA (OR) STUDY GROUP

**OVERVIEW OF THE**

**TEST AND**

**EVALUATION PROCESS**

## **BASIC DEFINITIONS**

### **TEST**

A PROGRAM, PROCEDURE, OR PROCESS TO OBTAIN, VERIFY, OR PROVIDE DATA FOR DETERMINING THE DEGREE TO WHICH A SYSTEM (OR SUBSYSTEM) MEETS, EXCEEDS, OR FAILS TO MEET ITS STATED OBJECTIVES.

### **EVALUATION**

THE REVIEW, ANALYSIS, AND ASSESSMENT OF DATA OBTAINED FROM TESTING AND/OR OTHER SOURCES.

## **OVERVIEW OF THE T&E PROCESS**

- HIGHLY COMPLEX, WITH MANY SEPARATE BUT INTERRELATED ELEMENTS AND ORGANIZATIONS
- NUMEROUS CHANGES IN POLICY, ORGANIZATIONS, AND PROCEDURES DURING RECENT YEARS
- FACED WITH NEW TECHNOLOGICAL CHALLENGES IN THE COMING DECADE

## ORGANIZATIONS INVOLVED IN THE T&E PROCESS

### OPERATIONAL

- o USA TECOM - ALL SYSTEMS TECHNICAL TEST AND NON MAJOR SYSTEM INDEPENDENT ASSESSMENT
- o U.S. AMSAA - MAJOR SYSTEM TECHNICAL INDEPENDENT EVALUATION
- o USA OTEA - OPERATIONAL TEST (SELECTED) AND EVALUATIONS
- o USA TEST AND EXPERIMENTATION COMMAND (TEXCOM) - OPERATIONAL TESTING
- o USA TRADOC - CATEGORY 3 SYSTEMS EVALUATIONS
- o MSC/PEO/PM - EXPERIMENTATION AND SELECTED TECHNICAL TESTING (INCLUDES CONTRACTOR AND MAY INCLUDE TECOM OVERSIGHT)

### OVERSIGHT

- |            |                       |                      |
|------------|-----------------------|----------------------|
| o HQDA     | o OSD                 | o CONGRESS           |
| - DUSA(OR) | - DEPUTY DIRECTOR     | - GENERAL ACCOUNTING |
| - ASA(RDA) | OF DEFENSE RESEARCH   | OFFICE               |
| - DCSOPS   | AND ENGINEERING (T&E) |                      |
|            | - DOT&E               |                      |

**SOME RECENT CHANGES IN T&E PROGRAMS AND PROCESS**

1988	GUIDELINES FOR LIVE FIRE T&E PUBLISHED
1988	REALIGNMENT OF ARMY T&E RESPONSIBILITIES BASED ON 1988 DUSA(OR) STUDY
1987	REFINEMENT OF POLICY AND CLARIFICATION OF RESPONSIBILITIES BASED ON ARMY STAFF AND SECRETARIAT CHANGES (i.e., ARMY ACQUISITION EXECUTIVE-PEO-PM STRUCTURE)
1987	LIVE FIRE TESTING MANDATED BY NATIONAL DEFENSE AUTHORIZATION ACT (FY 87)
1987	REVISION TO SYSTEM ACQUISITION PROCESS (i.e. AAE-PEO-PM)
1986	REFINEMENT OF T&E POLICY FOR TEST AND EVALUATION MASTER PLANS AND DOT&E AND DUSDRE(T&E)
1984	DOT&E ESTABLISHED AS OT&E OVERSIGHT AGENCY

## **T&E CHALLENGES OF THE 90'S**

- **IMPACT OF ARMY THRUSTS**
  - **AGGRESSIVE DEVELOPMENT/EXPLOITATION OF TECHNOLOGY LEADS TO NEW MEASUREMENT REQUIREMENTS**
  - **SYSTEMS APPROACH - INTEROPERABILITY ISSUES**
- **NEW TESTING PHILOSOPHIES**
  - **REALISM: TARGETS, AND THREAT SIMULATORS**
  - **LIVE FIRE TESTING**
  - **EARLY USER INVOLVEMENT**



**STUDY ISSUES FOR  
TESTING AND EVALUATION**

- 1. STATEMENT OF REQUIREMENTS**
- 2. MANAGEMENT PROCESS**
- 3. MODELING AND SIMULATION**
- 4. T&E PERSONNEL POLICY**
- 5. ROLE OF CONTRACTOR**
- 6. FACILITIES AND INSTRUMENTATION**

## ISSUE #1: STATEMENT OF REQUIREMENTS

### ISSUE

DOCUMENTED STATEMENTS OF OPERATIONAL REQUIREMENTS AND T&E CRITICAL ISSUES THAT WILL ASSURE QUALITY PERFORMANCE IN THE FIELDED PRODUCT ARE CENTRAL TO SUCCESSFUL EXECUTION OF THE DEVELOPMENT PROCESS.

### FINDINGS

- ACQUISITION AND T&E ACTIVITIES ARE HIGHLY INTERDEPENDENT AND INTERRELATED.
- THE ARMY HAS AN ESTABLISHED MATERIEL OBJECTIVES AND REQUIREMENTS PROCESS DELINEATED IN AR 71-9.
- BETTER T&E OBJECTIVES AND RESULTS CAN BE OBTAINED WITH MORE CLEARLY DEFINED AND FOCUSED O&O CONCEPTS AND ROCs STATED AS OPERATIONAL CAPABILITIES RATHER THAN TECHNICAL CHARACTERISTICS.
- SHORT CUTS UNDERTAKEN TO ACCELERATE PROGRAMS OFTEN SERIOUSLY FLAW THE PROCESS AND RESULT IN POOR DEFINITION, DOCUMENTATION AND PRIORITIZATION OF BOTH ESSENTIAL OPERATIONAL REQUIREMENTS AND CRITICAL T&E ISSUES.
- THE ROC CAN BE IMPROVED BY BEING:
  - A MORE CLEAR AND POSITIVE STATEMENT OF OPERATIONAL PERFORMANCE TASKS ABSOLUTELY ESSENTIAL TO "WARTIME" MISSION SUCCESS.
  - CHALLENGED FOR OPERATIONAL ESSENTIALITY AND MANDATORY VERSUS DESIRED IMPORTANCE AS DESIGN CRITERIA VALIDATED BY EXPERIMENTATION AND/OR ANALYSIS.
  - A PRODUCT OF A "WHAT IS RIGHT FOR THE ARMY" COOPERATIVE ANALYTICAL EFFORT INVOLVING THE USER, DEVELOPER, TESTER, EVALUATOR AND SENIOR ARMY MANAGEMENT.
  - FLEXIBLE IN THE FORMATIVE STAGE BUT THEREAFTER PROTECTED AGAINST ALL BUT ESSENTIAL OPERATIONAL ADJUSTMENTS SUCH AS UPDATED THREAT.

## ISSUE #1: STATEMENT OF REQUIREMENTS

### FINDINGS (Con't)

- o AN ADEQUATE CROSSWALK BETWEEN THE OPERATIONAL AND ORGANIZATIONAL PLAN, ROC, SPECS AND REQUEST FOR PROPOSAL, TO ENSURE THE INTEGRITY AND QUALITY OF THE T&E PROCESS HAS NOT ALWAYS BEEN ACCOMPLISHED.
- o MUCH OF THE T&E PLANNING DOES NOT NOW REFLECT A PROGRESSIVE GROWTH IN OBJECTIVES THROUGH REASONABLE SEQUENTIAL STAGES THAT WILL ASSURE ESSENTIAL OPERATIONAL CAPABILITY IN THE FINAL PRODUCT.
- o EARLY EMPLOYMENT OF RESOURCES, SUCH AS COMBAT DEVELOPMENT AND CONCEPTUAL EXPERIMENTATION, HAVE NOT BEEN USED TO PROVIDE A SOUND BASIS FOR CONCEPTUAL DESIGN DECISIONS RELATED TO DOCTRINE, TACTICS, ORGANIZATION, AND MANPRINT.

### RECOMMENDATIONS

- o TRADOC REQUIRE EARLY AND EXTENSIVE CONCEPTUAL EXPERIMENTATION IN THE O&O PLANNING.
- o TEXCOM BE GIVEN THE MISSION AND THE ENSURED CAPABILITY TO PERFORM EARLY AND FOLLOW-ON CONCEPTUAL EXPERIMENTATION TO ENHANCE THE O&O PLAN AND ROC PROCESS
- o TRADOC CONTINUE TO DEMAND COMPLIANCE WITH THE ESTABLISHED REQUIREMENTS PROCESS, GET GREATER OPERATIONAL FOCUS IN ROCs, AND GIVE CONTINUING PRIORITY ATTENTION TO OBTAINING THE ESSENTIAL "WARTIME" OPERATIONAL CAPABILITIES IN THE FIELDDED ITEM.
- o ARMY MATERIEL COMMAND, IN COORDINATION WITH TRADOC, REVIEW AND REVISE POLICY AND PROCEDURES TO ASSURE THAT CRITICAL WARTIME CAPABILITIES (INCLUDING ESSENTIAL LOGISTICAL SUPPORT) ARE IDENTIFIED AND GIVEN PRIORITY IN TECHNICAL TESTING.

## DISCUSSION OF ISSUE #1: STATEMENT OF REQUIREMENTS

### **BACKGROUND**

THE REQUIREMENTS PROCESS IS THE DRIVING ELEMENT OF THE ARMY'S MATERIEL ACQUISITION SYSTEM. TEST AND EVALUATION IS A MAJOR CONTROLLING ELEMENT OF THAT SYSTEM AND SERVES AS THE INSURANCE POLICY OF THE END USER, THE SOLDIER ON THE BATTLEFIELD. THE ABILITY TO OBTAIN PRIORITIZED STATEMENTS OF OPERATIONAL REQUIREMENTS, ALONG WITH THE CRITICAL ISSUES TO BE ADDRESSED IN THE T&E PROCESS IS OF UTMOST IMPORTANCE TO THE U.S. ARMY.

THE ARMY HAS AN ESTABLISHED MATERIEL OBJECTIVES AND REQUIREMENTS PROCESS DEALING WITH O&O PLANS AND ROCs PER ARMY REGULATION 71-9. THE O&O PLAN IDENTIFIES CRITICAL T&E ISSUES AND CRITERIA AND THE ROC PROCESS WHICH FOLLOWS ALSO REQUIRES EARLY USER AND FOLLOW-ON TEST AND EXPERIMENTATION INPUTS THAT CAN DO SO MUCH TO DEFINE AND FOCUS THE ROC TO THE ESSENTIAL WARTIME PERFORMANCE NEEDS.

IN SOME CASES SHORT CUTS ARE TAKEN TO ACCELERATE A WEAPONS PROGRAM. THESE OFTEN HURT THE ARMY MORE THAN THEY HELP. IN THE CASE OF THE AQUILA AND FAASV THE ROC CAME BEFORE THE O&O PLAN AND ADDED A GREATER DEGREE OF RISK TO THESE PROGRAMS. IT WAS ALSO REPORTED THAT IN SOME INSTANCES, DOCTRINE AND ORGANIZATIONAL CONCEPTS WERE DETERMINED DURING TESTS AS OPPOSED TO BEING DEVELOPED AND APPROVED PRIOR TO TESTS.

ACQUISITION AND T&E ACTIVITIES ARE INTERDEPENDENT AND INTERRELATED. MUTUAL AGREEMENT IS NECESSARY BETWEEN THE USER AND TEST COMMUNITIES ON EVALUATION CRITERIA TO BE USED. THESE CRITERIA SHOULD BE RATIONAL, CREDIBLE AND DEFENSIBLE. KEY PERSONNEL THROUGHOUT THE PROGRAM SHOULD HAVE DEFINITIVE GUIDANCE ON THE SUBSTANTIVE CONTENT AND FORMAT OF O&O PLANS, ROCs AND OTHER USER RELATED DOCUMENTATION THAT IMPACT ON THE T&E PROCESS.

## DISCUSSION OF ISSUE #1: STATEMENT OF REQUIREMENTS

### **BACKGROUND (Con't)**

TO MINIMIZE T&E TIME AND COSTS, ROCs SHOULD NOT OVER SPECIFY CAPABILITIES OR REQUIRE CAPABILITIES THAT ARE NEITHER NECESSARY NOR COST-EFFECTIVE. ROCs SHOULD ALSO BE ORIENTED TOWARDS COMBAT MISSION REQUIREMENTS, DE-EMPHASIZING PEACETIME REQUIREMENTS. ONLY MINIMUM ESSENTIAL FEATURES SHOULD BE MANDATORY AND NEW REQUIREMENTS SHOULD BE AVOIDED DURING THE LATTER STAGES OF DEVELOPMENT AND TESTING. CONSTANTLY CHANGING ROC DEFINITIONS CONTRIBUTE TO T&E PROBLEMS. CONSTANTLY UPDATED DETAILED THREAT INFORMATION CAN REDUCE THE NEED FOR UNTIMELY CHANGES.

ROCs SHOULD STRESS THE OPERATIONAL CAPABILITIES DESIRED WHILE THE RFP DESCRIBES THE TECHNICAL CHARACTERISTICS TO MEET THE ROC. OT SHOULD BE DIRECTED TOWARD THE ROC AND TECHNICAL TESTING (TT) TOWARD THE RFP AND BOTH OT AND TT SHOULD BE FOCUSED ON ASSESSING AND ADDRESSING THE TECHNICAL RISKS ASSOCIATED WITH ACHIEVING AN ESSENTIAL WARTIME PERFORMANCE CAPABILITY.

THE EXISTING MATERIEL OBJECTIVES AND REQUIREMENTS PROCESS MANDATED BY AR 71-9 IS WELL ORGANIZED AND CLEARLY STATED. IT NEEDS LITTLE BUT EMPHASIS AND ENFORCEMENT. DEVIATIONS IN THE PROCESS MUST BE MINIMIZED. VERY CLOSE INTERRELATIONSHIP BETWEEN THE USER AND TEST COMMUNITIES SHOULD BE DEMANDED, PARTICULARLY RELATIVE TO THE NECESSITY OF A CONTINUING CROSS-WALK FROM THE O&O PLAN THRU THE RFP.

ON MAJOR PROGRAMS, AT LEAST, PRIORITY MUST BE GIVEN TO EARLY CONCEPTUAL EXPERIMENTATION USING THE RESOURCES AND TOOLS AVAILABLE TO THE FEASIBLE LIMIT. THE CAPABILITIES OF USATEC, THE TEST BOARDS, AND CIVILIAN FACILITIES OFFER BROAD OPPORTUNITIES FOR EARLY CRITICAL DECISIONS ON OPERATIONAL ISSUES. THESE DECISIONS, PROPERLY BASED AND INCORPORATED, CAN FAVORABLY IMPACT LITERALLY EVERY SUBSEQUENT EVENT IN THE ARMY ACQUISITION PROCESS. THIS COULD HAVE RESULTED IN IMPROVED WEAPONS SYSTEMS WHICH MET ESSENTIAL OPERATION CRITERIA IN A TIMELY, COST EFFECTIVE MANNER, e.g., AQUILLA, SGT YORK, LHX.

## ISSUE #2: MANAGEMENT PROCESS

### ISSUE

THE ARMY HAS A VERY COMPLICATED T&E PROCESS THAT NEEDS MORE DISCIPLINE AND SENIOR LEVEL MANAGEMENT ATTENTION.

### FINDINGS

- o ARMY T&E IS A COMPLEX PROCESS INVOLVING MANY DIFFERENT ORGANIZATIONS AND IS NOT WELL UNDERSTOOD.
- o MANY OF THE ARMY'S DIFFICULTIES IN T&E ARE THE RESULT OF THE ACQUISITION PROCESS.
- o NDIS RAISE UNIQUE DIFFICULTIES IN THE T&E PROCESS.
- o SENIOR ARMY MANAGERS HAVE HAD TO SPEND CONSIDERABLE TIME RESPONDING TO ISSUES AND CONGRESSIONAL CONCERNS AFTER PROBLEMS HAVE BEEN IDENTIFIED BY T&E.
- o TOO OFTEN THE ARMY HAS NOT PREPARED TEMPS ON TIME. TEMPS FOR MAJOR ARMY SYSTEMS VARY CONSIDERABLY IN QUALITY AND IN SOME CASES DO NOT EXIST.
- o THE EARLY PREPARATION OF THE TEMP AND ITS REVISIONS THROUGH THE DEVELOPMENT AND ACQUISITION OF A SYSTEM CAN BE A GOOD MANAGEMENT TOOL FOR INVOLVING SENIOR MANAGERS.
- o THE TEST INTEGRATION WORKING GROUP PROCESS IS AN EXAMPLE OF A GOOD INTERNAL ARMY MECHANISM FOR RAISING, RESOLVING, AND COORDINATING TESTING ISSUES. WHEN KNOWLEDGABLE EXPERIENCED REPRESENTATIVES STAY ON A TIWG FOR THE LIFE OF A TEST, THE T&E PROCESS APPEARS TO WORK WELL.

ISSUE #2: MANAGEMENT PROCESS

**FINDINGS (Con't)**

- FAILURES DURING TESTS, PARTICULARLY DEVELOPMENT TESTS, ARE A STANDARD PART OF THE DEVELOPMENT AND TESTING PROCESS. HOWEVER, SCHEDULE TIME AND FUNDS FOR MAKING CORRECTIONS AND THEN REPEATING EXPERIMENTS AND/OR TESTS ARE GENERALLY NOT AVAILABLE. THESE CREATE PRESSURES TO TAKE UNNECESSARILY HIGH RISKS.
- SCHEDULE-DRIVEN (VERSUS EVENT-DRIVEN) T&E ACTIVITIES CAUSE THE ARMY TO TAKE UNWARRANTED RISKS AND INCREASE THE LIKELIHOOD OF THE FAILURE OF SYSTEMS IN DEVELOPMENT.
- WHEN FUNDS ARE REDUCED, ATTEMPTS "TO CONTINUE TO DO IT ALL" MAY DEGRADE THE ABILITY TO DO ANY PROGRAM WELL.
- MANY T&E PROBLEMS RESULT FROM PRESSURES ON PERSONNEL TO SHORTCUT THE PROCESS BY DEVIATING FROM STATED ARMY T&E POLICIES AND PROCEDURES. PRUDENT MANAGEMENT INVOLVES TAKING SHORTCUTS AND ASSOCIATED RISKS WITHOUT COMPROMISING FUNDAMENTAL PRINCIPLES OR TREATMENT OF CRITICAL ISSUES. IN TOO MANY CASES, HOWEVER, WELL-INTENTIONED SHORTCUTS HAVE DEALT WITH FUNDAMENTAL OR CRITICAL ISSUES INADEQUATELY AND HAVE ACTUALLY LENGTHENED THE ACQUISITION PROCESS.

## ISSUE #2: MANAGEMENT PROCESS

### RECOMMENDATIONS

- THE ARMY ENFORCE MORE DISCIPLINE AND INCREASE SENIOR MANAGEMENT CONTRIBUTIONS IN IMPLEMENTING EXISTING ACQUISITION POLICIES AND PROCEDURES BECAUSE THE SUCCESS OF T&E, AND OF THE SYSTEMS IN ACQUISITION, IS STRONGLY DEPENDENT ON THESE ACTIONS SPECIFICALLY:
  - SENIOR ARMY MANAGEMENT SPEND MORE TIME CONTRIBUTING TO THE EARLY STAGES OF MAJOR DEVELOPMENTAL AND NON-DEVELOPMENTAL PROGRAMS TO REDUCE TIME SPENT LATER ON "FIGHTING FIRES."
  - THE AAE ENFORCE THE POLICY THAT NO TESTING START WITHOUT AN ARMY APPROVED TEMP.
  - PMS/PEOs DEVELOP AND USE FUNDING AND MILESTONE SCHEDULES WHICH PROVIDE FOR FIXES IF DEVELOPMENT TESTS RESULT IN FAILURES OR NEEDED IMPROVEMENTS.
  - THE COMMANDERS OF TEXCOM AND OTEA AND THE PEOs CONTINUE TO RESIST PRESSURES TO TEST SYSTEMS IF THEY ARE NOT READY AND DEFEND THE NEED FOR T&E TO BE EVENT DRIVEN VS. SCHEDULE DRIVEN.
  - THE COMMANDERS OF TRADOC, AMC, AND OTEA, THE VICE CHIEF OF STAFF (VCSA), AND THE UNDER SECRETARY OF THE ARMY PRIORITIZE ACQUISITION PROGRAMS SO THAT ALL ELEMENTS OF THESE PROGRAMS, INCLUDING T&E, CAN BE DONE WELL. DO THE HIGHEST PRIORITY ONES COMPLETELY AND CORRECTLY AT THE EXPENSE OF CANCELLING LOWER PRIORITY PROGRAMS IF ADEQUATE FUNDING FOR TESTING IS NOT INCLUDED IN THE BUDGET.



## DISCUSSION OF ISSUE #2: MANAGEMENT PROCESS

### **BACKGROUND**

THERE APPEARS TO BE A LACK OF MANAGEMENT EMPHASIS AND DISCIPLINE ON T&E. AS SYSTEMS INCREASE IN TECHNOLOGICAL SOPHISTICATION AND COMPLEXITY, MORE EFFORT IS NEEDED TO MANAGE THE T&E PROCESS (AS WELL AS THE ENTIRE ACQUISITION PROCESS). TWO TYPES OF INCREASED MANAGEMENT ATTENTION ARE NEEDED:

- (1) SENIOR MANAGEMENT OF THE ACQUISITION PROCESS, INCLUDING T&E.

SENIOR MANAGEMENT MUST BE MORE INVOLVED EARLY IN THE T&E PART (AS WELL AS THE OTHER PARTS) OF THE ACQUISITION PROCESS. THAT IS THE ONLY WAY THE RIGHT ISSUES WILL BE EXAMINED WITH THE APPROPRIATE EMPHASIS. DECISIONMAKERS SHOULD BE MORE DISCIPLINED IN INSISTING ON AND USING A THOROUGH T&E PROCESS.

EARLY INVOLVEMENT BY SENIOR DECISION MAKERS DOES NOT MEAN THAT THEY SHOULD BECOME THE DAY-TO-DAY PMS. APPROPRIATE EARLY INVOLVEMENT IS INITIAL AND THEN PERIODIC FOLLOW-UP REVIEW TO INSURE THAT O&O PLANS, ROCS, AND TEST PLANS ARE: (1) STATED IN TERMS THAT ARE APPROPRIATE FOR AND IN THE INTERESTS OF THE ARMY; (2) CONSISTENT WITH OTHER ARMY PROGRAMS AND OVERALL ARMY PRIORITIES WITHIN FUNDING LEVELS; AND (3) APPROPRIATELY WRITTEN TO COVER "NEEDS" VERSUS "DESIRES" IN TERMS OF OPERATIONAL NEEDS, ESSENTIAL TESTS, AND KEY CRITERIA FOR SUCH ESSENTIAL TESTS.

SENIOR ARMY MANAGERS (BOTH CIVILIAN AND MILITARY) SHOULD BE AS DISCIPLINED ABOUT CONDUCTING PERSONAL PERIODIC REVIEWS AS THEY ARE ABOUT ASSERTING THE NEED FOR "CONTINUOUS EVALUATION" OF SYSTEMS WITHIN THE T&E COMMUNITY. SENIOR MANAGERS HAVE THE PERSPECTIVE GAINED FROM DEALING WITH OSD AND CONGRESSIONAL CONCERNS.

## DISCUSSION OF ISSUE #2: MANAGEMENT PROCESS

### **BACKGROUND (con't)**

THEY SHOULD NOT AUTOMATICALLY ASSUME THAT THE FINAL PRODUCT WILL ARRIVE "ON TIME" AND ADDRESS ALL THE "RIGHT" ISSUES WITHOUT THEIR EARLY INVOLVEMENT AND SUBSEQUENT REVIEW. SENIOR MANAGERS NEED TO PROVIDE CRITICAL REVIEW AND CONSTRUCTIVE CRITICISM WITHOUT STIFLING INNOVATION OR "DIRECTING A SOLUTION" (WHICH LATER MIGHT NOT BE DEFENDABLE EITHER WITHIN OR EXTERNAL TO THE ARMY). SENIOR MANAGERS CURRENTLY GET DEEPLY INVOLVED AFTER SYSTEMS HAVE PROBLEMS. THEY SHOULD BETTER BALANCE THEIR PRIORITIES TO PREVENT THE OCCURRENCE OF AS MANY SUCH PROBLEMS. THIS COULD RESULT IN MORE SUCCESSSES FOR ARMY ACQUISITION PROGRAMS WITH LESS OVERALL TIME DEVOTED BY THE SENIOR MANAGEMENT WHEN THEY GET "AHEAD OF THE POWER CURVE."

### **(2) MANAGEMENT BY THE T&E COMMUNITY OF THE T&E PROCESS.**

THE T&E PROCESS APPEARS TO BE FRAGMENTED AND OVERLY COMPLEX. THE FRAGMENTATION, ALONG WITH FREQUENT CHANGES IN PERSONNEL, MAKES IT DIFFICULT TO PINPOINT THE KEY PERSON WHO IS CAPABLE OF AND HAS THE RESPONSIBILITY AND AUTHORITY FOR DEVELOPING THE T&E PROGRAM FOR A PARTICULAR SYSTEM. THERE IS A LACK OF STABILITY AND CONTINUITY OF COORDINATION, WHICH ARE NEEDED TO PRODUCE A LOGICAL PROGRESSION OF STEPS IN THE T&E PROGRAM FOR A GIVEN SYSTEM. EXCESSIVE COSTS MAY RESULT FROM DUPLICATION AND UNNECESSARY OR POORLY SEQUENCED TESTS.

GIVEN THE COMPLEXITY OF THE ARMY'S T&E SYSTEM AND THE NEED FOR MAINTAINING STABILITY (IN ALL ASPECTS OF ARMY ORGANIZATIONS AND PROGRAMS, NOT JUST T&E), THE TIWG'S ARE AN EXCELLENT EXAMPLE OF A GOOD MECHANISM FOR RAISING, RESOLVING, AND COORDINATING TESTING ISSUES WHICH SHOULD BE CONTINUED. VERBAL REPORTS TO THE ASB SUMMER STUDY GROUP INDICATED THAT TIWGS WORK WELL WHEN THE REPRESENTATIVES TO THE GROUP ARE BOTH KNOWLEDGEABLE AND DO NOT CHANGE FREQUENTLY DURING THE LIFE OF THE PROGRAM. IF THE MEMBERS TO THE GROUP ARE INEXPERIENCED, AND CANNOT SPEAK WITH ANY ASSURANCE OR CONFIDENCE (EG., CANNOT SAY "IF YOU STATE THE REQUIREMENT IN THOSE TERMS, I CAN ASSURE YOU THAT THE SYSTEM WILL BE UNABLE TO MEET IT DURING TESTS, AND THEREFORE WILL 'FAIL' IN THE EYES OF ANY CRITIC"), EVEN THE BEST TIWG PROCESS CANNOT ENSURE GOOD RESULTS.

DISCUSSION OF ISSUE #2: MANAGEMENT PROCESS

**BACKGROUND (con't)**

MANY T&E PROBLEMS BEGIN DURING PROGRAM INITIATION, PRIOR TO THE FIRST PREPARATION OF THE ROC. OPERATIONAL REQUIREMENTS FOR SYSTEMS ARE NOT CONSISTENTLY DEVELOPED AND DOCUMENTED IN A THOROUGH PROFESSIONAL MANNER. IN ADDITION, THE O&O PLANS, INCLUDING THE DOCTRINE FOR USE, ARE SOMETIMES INCOMPLETE OR NOT WELL THOUGHT OUT. AQUILLA WAS A CASE-IN-POINT. FORCE DEVELOPMENT TEST AND EXPERIMENTATION (FDT&E), AND OTHER EARLY USER TESTS, WHICH CAN BE OF MAJOR ASSISTANCE IN DEVELOPING DOCTRINE AND O&O PLANS FOR NEW CONCEPTS OR SYSTEMS, ARE OFTEN INADEQUATE OR OMITTED ALTOGETHER.

MORE DISCIPLINE AND INITIAL INVOLVEMENT OR OVERSIGHT BY TRADOC GENERAL OFFICERS, OF WHICH THERE IS SOME EVIDENCE IN THE PAST YEAR OR SO, IS NEEDED TO INSURE THAT ROCs ARE STATED IN TERMS OF OPERATIONAL NEEDS AND NOT IN TERMS OF "TECHNICAL CHARACTERISTICS." MOREOVER, IF ROCs ARE TO CONTAIN ANY STATEMENTS OF DESIRABLE FEATURES VS. OPERATIONAL NEEDS, SUCH DESIRABLE BUT NOT ESSENTIAL FEATURES NEED TO BE DELINEATED CLEARLY. IF THEY ARE NOT CLEARLY DELINEATED, EITHER THE TEST COMMUNITY AND/OR CRITICS OF ARMY PROGRAMS WILL CONSIDER SUCH ROC STATEMENTS AS "REQUIREMENTS" AND ARGUE THAT THE ARMY SHOULD NOT CONTINUE PROGRAMS WHERE THE SYSTEMS "HAVE NOT PASSED THE REQUIREMENTS TESTS." THIS MAY UNNECESSARILY JEOPARDIZE PROGRAMS.

TRADOC (AND ODCSOPS IN REVIEWING AND APPROVING ROCs) NEEDS TO KEEP OUT OR STRIP OUT "TECHNICAL CHARACTERISTICS" FROM ROCs. FAILURE TO DO SO WILL ONLY RESULT IN THE T&E COMMUNITY CONTINUING TO TEST AND EVALUATE SYSTEMS AGAINST THE STATED REQUIREMENTS (AS THEY SHOULD) AND THEREBY INCREASE THE PROBABILITY THAT SYSTEMS WILL "FAIL" TESTS IN THE EYES OF CRITICS. MOREOVER, IT CAN BE ARGUED PERSUASIVELY THAT SYSTEM DESIGNERS (INDUSTRY) AND NOT COMBAT DEVELOPERS -- OR EVEN THE PROJECT MANAGERS -- SHOULD HAVE THE FLEXIBILITY TO ADJUST AND/OR TRADEOFF AMONG TECHNICAL CHARACTERISTICS TO BEST DESIGN A SYSTEM TO MEET THE OPERATIONAL NEEDS THAT SHOULD BE APPROPRIATELY STATED BY THE COMBAT DEVELOPERS. IF THE ARMY IS TO STATE SPECIFIC TECHNICAL CHARACTERISTICS OR REQUIREMENTS ANY PLACE IN THE ACQUISITION PROCESS, IT SHOULD BE IN THE RFPS AND NOT IN THE

## DISCUSSION OF ISSUE #2: MANAGEMENT PROCESS

### **BACKGROUND (con't)**

ROCS. THIS ASB SUMMER STUDY GROUP BELIEVES THAT THE ARMY COULD IMPROVE ITS OVERALL ACQUISITION PROCESS (AND THE SYSTEMS PROCURED THEREFROM), AND SIGNIFICANTLY IMPROVE ITS CREDIBILITY IN THE T&E PROCESS IF IT WOULD LEAVE MORE OF THE DETAILED SYSTEM DESIGN TO INDUSTRY AND GET OUT OF, OR SIGNIFICANTLY REDUCE ITS ROLE IN, SPECIFYING TECHNICAL VS. OPERATIONAL CHARACTERISTICS.

THE ARMY HAS OFTEN NOT PREPARED TEMPS IN A TIMELY FASHION AS THEY ARE REQUIRED BY THEIR OWN ARMY POLICIES AND PROCEDURES. (SEE TABLE 1 ON THE NEXT PAGE.) PM'S APPEAR TO BE RELUCTANT TO SPECIFY IN ADVANCE (ANY MORE THAN ABSOLUTELY REQUIRED) THE CONDITIONS TO WHICH THEIR SYSTEMS SHOULD PERFORM DURING TESTS, AND PARTICULARLY THE OTS FOR WHICH AN INDEPENDENT EVALUATION IS TO BE PREPARED EXTERNAL TO THE PM'S CONTROL. THIS IS AN UNDERSTANDABLE TRAIT OF HUMAN NATURE, BUT IT CAN AND DOES CREATE PROBLEMS FOR THE INDEPENDENT TEST DESIGNERS AND EVALUATORS.

THE BEST MEANS TO INSURE THAT PM'S PREPARE TIMELY AND COMPLETE TEST PLANS MAY BE TO CREATE AN INCENTIVE (OR DISINCENTIVE) SYSTEM THAT WILL OVERCOME ANY OR MOST TEMPTATIONS TO DELAY THE PREPARATION OF SUCH DOCUMENTS. THE ASD(RDA) OR THE AAE COULD CREATE A SYSTEM WHEREBY THE FAILURE TO PREPARE A TIMELY AND COMPLETE TEMP WOULD RESULT IN: (1) A FUNDING OR SCHEDULE SLIPPAGE OR REDUCTION FOR THE PROGRAM; (2) A LESS THAN PERFECT EFFICIENCY REPORT FOR THE RESPONSIBLE INDIVIDUAL(S); OR (3) SOME OTHER MECHANISM THEY THINK TO BE APPROPRIATE. THIS WOULD BE THE STICK RATHER THAN THE CARROT APPROACH.

ON THE INCENTIVE SIDE THE BEST THING THE ARMY COULD DO IS TO PROVIDE REWARDS IN PLACE FOR PERSONNEL IN THE ACQUISITION SYSTEM WHO CARRY OUT ALL THEIR ASSIGNED RESPONSIBILITIES IN AN OUTSTANDING MANNER. EXCELLENT PERSONNEL IN THE ACQUISITION PROCESS, INCLUDING BY DEFINITION INDIVIDUALS IN THE T&E PROCESS, SHOULD BE ABLE TO PROGRESS AND SUCCEED IN THE ARMY WHILE STAYING IN PLACE FOR THE PROGRAM LIFE CYCLE (OR A MAJOR SEGMENT THEREOF). THEY SHOULD NOT FEEL THE PRESSURE TO ROTATE OUT IN ORDER TO GET AHEAD.

TABLE 1

## ARMY PROGRAM TEMP STATUS

APPROVED & CURRENT	OUT OF DATA	RETURNED (DATE)	IN REVIEW	NO TEMP
FAADS: CAPSTONE *	M1 TANK	AAWA-H ** (OCT 87)	AHIP	ADDS
C2I *, LOS-F-H *,			AAWS-M **	ASAS/EASCE
LOS-R *		FAADS-NLS (NOV 87)	AFV **	AFATDS
HMMWV *		LHX (NOV 87)	BRADLEY ** (M2/M3)	M88A1
MSE *		MCS (MAY 87)	FHTV **	M939A2/5T
9MM *		MLRS-TGW ** (DEC 87)	FMTV **	M109A2/155
SAW		STINGER RMP (DEC 87)	SADARM	RPV
		STINGER ATAS	ATACMS **	REGENCY NET
		SINGARS (NOV 86)	SINGARS	MSAM
			ACCS	EPLARS

\* CONDITIONAL APPROVAL

\*\* DRAFT TEMP (NOT SERVICE APPROVED)

SOURCE: FEBRUARY 18, 1988 BRIEFING BY DR. H. STEVEN KIMMEL, ENTITLED  
ARMY TEST AND EVALUATION, AN OSD INTERPRETATION

## DISCUSSION OF ISSUE #2: MANAGEMENT PROCESS

### **BACKGROUND (con't)**

STABILITY AND CONTINUITY OF EXPERIENCED PERSONNEL IN THE ACQUISITION PROCESS APPEAR TO BE MAJOR FACTORS IN WHETHER PROGRAMS ARE VIEWED AS "SUCCESSSES" OR WHETHER THEY PROCEED THROUGH THE T&E PROCESS WITH GREAT DIFFICULTY. TURBULENCE IN ASSIGNMENTS RELATED TO THE ORIGINATION AND DEVELOPMENT OF REQUIREMENTS, PROGRAM MANAGEMENT, AND T&E FOR A SYSTEM CAN ADVERSELY AFFECT SYSTEMS. THE AQUILLA, A CASE REVIEWED IN SOME DETAIL BY THIS ASB GROUP, WAS A PROGRAM WHERE EXCESSIVE TURBULENCE CONTRIBUTED TO ITS DEMISE. THE MLRS, WHICH IS GENERALLY VIEWED AS A VERY SUCCESSFUL ACQUISITION PROGRAM (INCLUDING THE T&E PORTIONS), ON THE OTHER HAND, HAD STABILITY IN PERSONNEL. THOSE INVOLVED WITH THE PROGRAM BELIEVE THIS STABILITY CONTRIBUTED SIGNIFICANTLY TO ITS SUCCESS.

IF THERE IS A LACK OF STABILITY AND PERSONNEL KNOW THEY WILL BE ROTATING OUT, THERE IS LESS INCENTIVE AND LITTLE MOTIVATION TO CORRECT THINGS EVEN WHEN FAULTS OR FLAWS ARE DETECTED. THERE IS A TENDENCY TO LEAVE THE PROBLEM FOR THE NEXT INDIVIDUAL TO SOLVE ON HIS WATCH. THIS CAN LEAD TO ISSUES FLOATING ALONG WAITING FOR CATASTROPHE TO OCCUR.

FAILURES DURING TESTS, PARTICULARLY DEVELOPMENT TESTS, ARE A STANDARD PART OF THE DEVELOPMENT AND TESTING PROCESS. HOWEVER, MOST DOD (AND THEREFORE MOST ARMY) ACQUISITION PROGRAMS DO NOT HAVE SCHEDULES OR FUNDING PROFILES THAT ALLOW FOR SUCH FAILURES, AND THE FIXES THEREOF. PRESSURES TO ACCELERATE THE ACQUISITION PROCESS AND TO GET SYSTEMS INTO THE FIELD AS QUICKLY AS POSSIBLE CONTRIBUTE TO THE MAKING OF "SUCCESS ORIENTED" PLANS. IN ADDITION, MANAGERS WILL ASSERT THAT IF A FUNDING PROVISION IS MADE FOR ANYTHING OTHER THAN A SUCCESS ORIENTED PLAN, THEN INDUSTRY WILL GUARANTEE THAT THE FUNDS ARE SPENT (I.E., IT WILL BE A SELF-FULFILLING PROPHECY).

THE DIFFICULTY ASSOCIATED WITH NOT PLANNING FOR DEVELOPMENT AND TESTING PROBLEMS IS THAT WHEN THEY DO OCCUR, THERE IS GREAT PRESSURE TO STAY ON SCHEDULE AND THEREBY ACCEPT ADDED RISKS OF LARGER PROBLEMS LATER ON IN THE ACQUISITION PROCESS. TAKING SHORTCUTS AND/OR PURSUING ORIGINAL OBJECTIVES WHEN SUBSEQUENT EVENTS INDICATE THAT THE PRUDENT COURSE WOULD BE TO MAKE A FIX BEFORE CONTINUING CAN, AND MANY TIMES DOES, LEAD TO A SUBSEQUENTLY LARGER OR INSOLVABLE PROBLEM AND A FURTHER LOSS OF CREDIBILITY. FOR EXAMPLE, WHEN THE ARMY DELETED SOME DEVELOPMENT STEPS IN THE PATRIOT PROGRAM IN AN ATTEMPT TO GET IT INTO THE FIELD FASTER, THE EVENTUAL DEPLOYMENT WAS DELAYED. THE FOLLOWING SYSTEMS ARE OTHER EXAMPLES WHERE SHORTCUTS IN DEVELOPMENT AND/OR TESTING AND IMPLEMENTATION FIXES LED TO PROBLEMS IN OPERATIONAL TESTING AND PROGRAM DELAYS: ALL-SOURCE ANALYSIS SYSTEM, INTERMEDIATE FORWARD TEST EQUIPMENT, SERGEANT YORK, BFVS, SINGARS, AND M109 - HELP.

## DISCUSSION OF ISSUE #2: MANAGEMENT PROCESS

### BACKGROUND (con't)

ANOTHER AREA WHERE POTENTIAL PROBLEMS EXIST ASSOCIATED WITH NOT PROVIDING FOR TESTS AND POSSIBLE TEST FAILURES IS IN THE ACQUISITION OF SOME TYPES OF NDIS. WHEN NDIS EQUIPMENT REQUIRES SUBSYSTEM DEVELOPMENT OR SYSTEM INTEGRATION VS JUST PROCUREMENT OFF-THE-SHELF (E.G., MULTIPLE SUBSCRIBER EQUIPMENT (MSE), WHERE MUCH OF THE HARDWARE AND NEARLY ALL OF THE SOFTWARE IS NEW AND NOT OFF-THE-SHELF), THERE SHOULD BE PROVISION TO DO SUFFICIENT TT AND MAKE FIXES BEFORE GOING TO OT. IN THE CASE OF MSE, THE ARMY IS APPROPRIATELY DELAYING THE PERFORMANCE OF OT LATE IN THE PROCESS AT CONSIDERABLE EXPENSE UNTIL THE SYSTEM IS READY FOR OT. HOWEVER, IF THERE HAD BEEN A PROVISION FOR DOING SUFFICIENT TT IN THIS NDI ACQUISITION, THE DELAY IN OT WOULD HAVE BEEN REDUCED OR ELIMINATED ALL TOGETHER.

A POSSIBLE SOLUTION IN PLANNING SCHEDULES AND FUNDING PROFILES FOR NEW PROGRAMS IS TO DEVELOP A TWO TRACK PLAN. THE FIRST TRACK WOULD CONTAIN THE SCHEDULE DATES AND ASSOCIATED FUNDING PROFILE IF ALL GOES WELL. THE SECOND OR FALLBACK TRACK WOULD CONTAIN OR SHOW THE SCHEDULE AND FUNDING ADJUSTMENTS THAT ARE ESTIMATED TO BE NEEDED IF SOME NUMBER (E.G., X) FAILURES OCCUR DURING DEVELOPMENT AND TESTING. THE BASIC PRINCIPLE IS TO PROJECT A RANGE FOR BOTH SCHEDULE AND COST RATHER THAN A POINT ESTIMATE (WHICH IS ALMOST CERTAIN TO BE WRONG).

IF THE DOD CAN COPE WITH RANGES VS. POINT ESTIMATES FOR THREATS, IT SHOULD BE ABLE TO COPE WITH THEM FOR ITS OWN DEVELOPMENT SCHEDULES AND R&D FUNDING PROFILES. MOREOVER, ANY INCREMENTAL FUNDING TO COVER THE CONTINGENCIES OF FAILURES DURING DEVELOPMENT AND TESTING NEED NOT BE GIVEN INITIALLY TO THE PM. IT COULD BE MAINTAINED UNDER THE CONTROL OF INDIVIDUAL PEOS OR AT A HIGHER LEVEL. IN ADDITION THE FUNDING RESERVE (AS OPPOSED TO THE SCHEDULE FOR THE SECOND TRACK) FOR MULTIPLE PROGRAMS MIGHT BE MAINTAINED AT Y% OF THE SUM OF THE ESTIMATED FUNDING RESERVES THAT WOULD BE NEEDED IF ALL 100% WERE TO HAVE FAILURES. THE Y% COULD BE DETERMINED BASED ON HISTORICAL EXPERIENCE AND A JUDGMENT AS TO THE APPLICABILITY OF THAT EXPERIENCE TO THE REVISED MANAGEMENT APPROACH.

### ISSUE #3: MODELING AND SIMULATION

#### ISSUE

COMPUTER MODELING AND MANNED SIMULATION ARE POWERFUL TOOLS NOT USED OPTIMALLY TOGETHER DURING THE ARMY'S T&E PROCESS.

#### FINDINGS

- THE ARMY DOES NOT HAVE A COMPREHENSIVE POLICY REGARDING THE DEVELOPMENT AND USE OF COMPUTER MODELING AND MANNED SIMULATION DURING T&E.
- THE PRESENT USE OF COMPUTER MODELS AND MANNED SIMULATION IN SUPPORT OF THE T&E PROCESS IS:
  - LIMITED IN SCOPE AND PLANNING AND UNDER-RESOURCED BY THE ARMY AND ITS MAJOR CONTRACTORS.
  - FRAGMENTED BETWEEN PHASES OF TESTING AND T&E ORGANIZATIONS.
  - LACKING CREDIBILITY WITH ELEMENTS OF OSD AND CONGRESS.
  - INCONSISTENT IN SUPPORTING TEST QUALITY AND IN REDUCING RESOURCE REQUIREMENTS.
- THESE COMPUTER MODELS AND MANNED SIMULATIONS GENERALLY ARE WITHOUT:
  - LINKAGES AND DO NOT ENCOMPASS SUPPORTABILITY/LOGISTICS, SOLDIER (OPERATOR/MAINTAINER) PERFORMANCE, AND SPECIAL ISSUES SUCH AS ELECTRONIC WARFARE AND NUCLEAR, BIOLOGICAL, AND CHEMICAL EFFECTS.
  - SUFFICIENT VALIDATION AND ARE NOT UPGRADED TO USE FIELD TEST RESULTS, LESSONS LEARNED, AND OTHER SOURCES OF EXTERNAL DATA.
  - A SINGLE COORDINATING POINT, A SUPPORTING TECHNOLOGY BASE AND APPROPRIATE TRAINING FOR ARMY PROFESSIONALS.
  - STABLE OPERATOR/MAINTAINER ADVISORY PANELS TO PROVIDE EARLY USER INPUT.



### ISSUE #3: MODELING AND SIMULATION

#### FINDINGS (Con't)

- o THE APPLICATION AND SCHEDULING OF COMPUTER MODELS AND SIMULATION IN T&E DO NOT:
  - HAVE CONTINUITY FROM CONCEPTUAL DESIGN THROUGH FIELD TEST.
  - HAVE INTEGRATED FRAMEWORKS FOR LIVE FIRE AND FIELD TEST.
  - PROVIDE FOR IMPROVED FEEDBACK AND VALIDATION.
  - ENCOURAGE THE USE OF SYSTEM CONTRACTOR ANALYTICAL EXPERTISE AND DATA, SIMULATOR FACILITIES AND MODELS.

#### RECOMMENDATIONS

- o ESTABLISH POLICY AND IMPROVE CAPABILITY FOR THE USE AND SCHEDULING OF COMPUTER MODELS AND MANNED SIMULATION IN SUPPORT OF THE T&E PROCESS.
  - UNDER SECRETARY OF ARMY ESTABLISH THE DUSA(OR) AS THE SINGLE POINT OF ARMY RESPONSIBILITY FOR MANAGEMENT, COORDINATION, USE AND VALIDATION OF COMPUTER MODELS AND MANNED SIMULATION IN SUPPORT OF T&E.
  - UPGRADE MODELING AND SIMULATION METHODOLOGIES (AMC, TRADOC AND ARMY RESEARCH INSTITUTE), EXPAND TRAINING (DEFENSE SYSTEMS MANAGEMENT COLLEGE, TRADOC, AMC AND OTEA), AND INCREASE FACILITIES AND RESOURCES (AMC AND TRADOC).
  - AMC, TRADOC, AND OTEA DETERMINE WHERE THESE TOOLS CAN SUPPORT T&E, WITH EMPHASIS ON SYSTEM TESTS TO:
    - DEFINE THE CRITICAL MAN-MACHINE INTERFACE (AIRCRAFT, MAN-IN-THE-LOOP GUIDANCE, COMMAND AND CONTROL).
    - SAVE SIGNIFICANT RESOURCES.
    - OVERCOME MAJOR SAFETY, SECURITY, OR ENVIRONMENTAL CONSTRAINTS.
  - AMC, TRADOC AND OTEA IMPROVE THE APPLICATION AND SCHEDULING OF COMPUTER MODELS AND MANNED SIMULATION IN T&E.

### DISCUSSION OF ISSUE #3: MODELING AND SIMULATION

#### **BACKGROUND**

AT PRESENT THE ARMY LACKS A POLICY REGARDING THE USE OF COMPUTER MODELING AND MANNED SIMULATION IN SUPPORT OF T&E AND MORE IMPORTANTLY, THERE IS A LACK OF EXPERTISE IN THE DEVELOPMENT AND USE OF THESE TOOLS, AND THERE IS NO SINGLE COORDINATING ACTIVITY FOR THE DEVELOPMENT, USE AND MAINTENANCE ACROSS THE MANY T&E ACTIVITIES. PRESENT COORDINATING ACTIVITIES THROUGH THE ARMY MODEL IMPROVEMENT PROGRAM DEAL ONLY WITH COMPUTER SIMULATIONS AND COMPUTER ASSISTED WARGAMES.

MAJOR BARRIERS TO THE INCREASED USE OF MODELS AND SIMULATION, IN ADDITION TO THE TECHNICAL CHALLENGE OF THEIR PROPER USE, ARE (1) THE NEED TO OVERCOME UNFOUNDED PERCEPTIONS REGARDING THEIR CREDIBILITY AND REALISM, AND (2) THAT THEIR USE WOULD INCREASE T&E COSTS.

A MAJOR CONCERN WITH THE USE OF MODELS AND SIMULATION BY DECISION MAKERS IN THE ARMY, DOD, AND CONGRESS HAS BEEN THEIR VALIDATION AND SCOPE. THIS CONCERN HAS LIMITED THEIR UTILITY AND FORCED INCREASED EMPHASIS ON EXTENSIVE FIELD TESTING AND LIVE FIRE. MODELING COMBINED WITH SIMULATION HAS A POTENTIAL FOR HIGHER PRECISION ESPECIALLY FOR AREAS SUCH AS COMPLEX TARGETING, EFFECTS OF DEGRADED CONDITIONS ON HUMAN PERFORMANCE, OR WHERE SECURITY AND SAFETY CONCERNS PRECLUDE FULL FIELD TESTING. HOWEVER, IF MODELING AND SIMULATION ARE CONSIDERED A PART OF THE SPECTRUM OF TOOLS AVAILABLE FOR T&E, THEN THEY CAN ENHANCE DEVELOPMENT AND FIELD TESTS SIGNIFICANTLY.

COMPUTER MODELING AND MANNED SIMULATION USED TOGETHER HAVE A POTENTIAL FOR BOTH IMPROVING QUALITY AND REDUCING THE RESOURCES REQUIRED IN TESTING. THIS CAN BE ACCOMPLISHED THROUGH EARLIER IDENTIFICATION OF SYSTEM PROBLEMS WHEN DESIGN CHANGES ARE LESS COSTLY AND WHERE EXPENSIVE AND ITERATIVE OPERATIONAL TESTS MIGHT BE REDUCED IN NUMBER AND SCOPE.

### DISCUSSION OF ISSUE #3: MODELING AND SIMULATION

#### **BACKGROUND (Con't)**

IN PARTICULAR, THEIR CONTINUOUS USE CAN PROVIDE A CONNECTING LINK BETWEEN T&E PHASES AND ORGANIZATIONS THAT HELP PREVENT FRAGMENTATION AND SUPPORTS THE HAND-OFF OF TEST DATA BETWEEN INTERFACES BY PROVIDING A UNIFYING FRAMEWORK FOR OPERATOR, MAINTENANCE, AND LOGISTICS FUNCTIONS. THE CONTINUOUS USE CYCLE (SEE APPENDIX FIGURE) INCLUDES DESIGN DATA AND ANALYSES, THREAT DATA, MOCKUPS, COMPUTER MODELS, MANNED/HARDWARE SIMULATION, FIELD TEST, AND FIELD USE WITH FEEDBACK LOOPS FOR VALIDATION. WE NOTED THAT IN ONLY A FEW CASES HAS THE ARMY ATTEMPTED TO VALIDATE THEIR MODELS AND SIMULATIONS. MODEL VALIDATION IS AN ESSENTIAL STEP IN THE OVERALL MODELING AND SIMULATION PROCESS. IT IS, HOWEVER, A VITAL STEP NOT ONLY FOR MODELS BUT MANNED SIMULATORS. THIS STEP MUST BE COMPLETED AND SHOULD BE WELL REPORTED AND THE REPORT WIDELY DISTRIBUTED IN ORDER TO IMPROVE ACCEPTANCE OF THE MODELS AND SIMULATORS.

IN SPITE OF THE EMPHASIS PLACED BY THE ARMY ON RAPID PROTOTYPING, MANPRINT AND THE EARLY IDENTIFICATION OF SOLDIER PERFORMANCE PROBLEMS, MANNED SIMULATION HAS HAD LIMITED USE BY THE ARMY AND ITS CONTRACTORS IN SUPPORT OF SYSTEM DESIGN AND T&E. IT IS NOW BEING USED, HOWEVER, BY THE ARMY FOR LHX, FORWARD AREA AIR DEFENSE SYSTEM, AND THE ARMORED FAMILY OF VEHICLES (SIMNET-D). MAJOR ARMY CONTRACTORS ALSO HAVE DEVELOPED A LIMITED NUMBER OF MANNED SIMULATORS ESPECIALLY FOR THE SUPPORT OF HELICOPTER PROGRAMS. HOWEVER, THE FULL POTENTIAL HAS NOT BEEN REALIZED BY THE ARMY AS IT HAS BEEN RECENTLY FOR THE F-15, F-18, AV-8B, AND SEVERAL MISSILES. WE HEARD NO EVIDENCE THAT MANNED SIMULATION IS BEING USED IN CONJUNCTION WITH MODELING FOR T&E ALTHOUGH LIMITED USE IS BEING MADE OF HARDWARE-IN-THE-LOOP SIMULATIONS AND MODELS.

THE ARMY PRESENTLY HAS MAN-IN-THE-LOOP SIMULATORS AT RESEARCH ORGANIZATIONS SUCH AS ARI, U.S. ARMY AEROMEDICAL RESEARCH LABORATORY, AEROMECHANICS LABORATORY/NASA AMES AS WELL AS T&E DEVICES AT TECOM AND SEVERAL OTHER ACTIVITIES. FROM A HISTORICAL PERSPECTIVE THE ARMY HAS BEEN A LEADER. AN EXAMPLE IS THE APPROXIMATELY 25 FIELD EXPERIMENTS CONDUCTED BETWEEN 1957 AND 1965 AT FORT HUNTER-LIGGETT BY CDEC (NOW USATEC) WHICH WERE COMPLEMENTED AND STRENGTHENED BY COMPUTER SIMULATIONS DONE BY STANFORD RESEARCH INSTITUTE.

### DISCUSSION OF ISSUE #3: MODELING AND SIMULATION

#### **BACKGROUND (Con't)**

THE ARMY IS MAKING PROGRESS IN USING SOME COMPUTER MODELS (SESAME AND OSAMM) FOR SPECIFIC APPLICATIONS SUCH AS THE ADEQUACY OF INITIAL PROVISIONING. PARTS REQUIRED FOR BATTLE DAMAGE REPAIR ALSO ARE BEING ESTIMATED USING EFFECTIVENESS MODELS MODIFIED TO DERIVE ACTUAL COMPONENTS SUSTAINING DAMAGE FOR INPUT INTO MANPOWER MODELS FOR MAINTENANCE AND BATTLE DAMAGE REPAIR.

#### ISSUE #4: TEST AND EVALUATION PERSONNEL POLICY

##### ISSUE

PERSONNEL WITH MULTIDISCIPLINARY ENGINEERING AND MANAGEMENT SKILLS NEED TO BE RETAINED IN STABLE ASSIGNMENTS FOR THE ARMY TO MEET ITS T&E GOALS.

##### FINDINGS

- THE COMPLEXITY AND TECHNICAL DEMANDS OF T&E REQUIRE EXTENSIVE ENGINEERING AND MANAGEMENT SKILLS.
- THERE IS GENERAL KNOWLEDGE WITHIN THE ARMY OF THE LACK OF A CLEARLY DEFINED CAREER DEVELOPMENT PATH FOR PROMOTION FOR T&E SPECIALISTS WHICH ENHANCES THE PROCUREMENT, DEVELOPMENT AND RETENTION OF HIGHLY SKILLED MILITARY AND CIVILIAN PERSONNEL.
- TURBULENCE OF PERSONNEL AND ITS RESULTANT INSTABILITY PRODUCES UNDESIRABLE CHANGES WHICH ADVERSELY AFFECT THE ENTIRE T&E PROCESS FROM ROCs AND TEMPS THROUGH FOLLOW-ON TEST AND EVALUATION.

ISSUE #4: TEST AND EVALUATION PERSONNEL POLICY

**RECOMMENDATIONS**

- TRADOC, AMC AND DCSPER-HQDA INCREASE THE LEVEL OF PROFESSIONAL TRAINING FOR T&E SPECIALISTS (E.G., SOFTWARE, MODELING AND SIMULATION SYSTEMS, DATA ANALYSIS, PROJECT MANAGEMENT).
- DCSPER-HQDA PROVIDE A CLEAR CAREER PATH FOR T&E SPECIALISTS (MILITARY AND CIVILIAN) BEGINNING AT THE ENTRY LEVEL, WHICH REWARDS SUCCESSFUL T&E PERFORMANCE WITH AN OPPORTUNITY FOR ADVANCEMENT TO GENERAL OFFICER AND SES LEVELS.
- DCSPER-HQDA PROVIDE STABILITY OF ASSIGNMENTS FOR MILITARY AND CIVILIAN PERSONNEL.

## DISCUSSION OF ISSUE #4: TEST AND EVALUATION PERSONNEL POLICY

### **BACKGROUND**

TO MEET THE ARMY T&E GOALS AND OBJECTIVES, INCREASED STABILITY OF MILITARY AND CIVILIAN PERSONNEL WITH MULTIDISCIPLINARY ENGINEERING AND MANAGEMENT SKILLS IS REQUIRED. THEY NEED TO BE PROFESSIONALLY TRAINED, MOTIVATED WITH EXPANDED CAREER OPPORTUNITIES, AND RETAINED IN STABLE ASSIGNMENTS FOR A TIME PERIOD WHICH IS MORE CONSISTENT WITH THE PROGRAM DEVELOPMENT LIFE CYCLE. WHILE PROGRAMS MAY BE SEVERELY INFLUENCED BY OUTSIDE GROUPS, THE ARMY HAS SOME RELATIVE CONTROL OVER IT'S PERSONNEL POLICIES.

THE COMPLEXITIES AND TECHNICAL DEMANDS OF T&E MAY NOT ALWAYS BE FULLY RECOGNIZED. IN ORDER TO UNDERSTAND THE FUNCTIONING OF TODAY'S COMPLEX WEAPONS SYSTEMS, T&E SPECIALISTS NEED AN INDEPTH KNOWLEDGE OF AREAS SUCH AS COMPUTER SOFTWARE, COMMUNICATIONS, SYSTEMS ENGINEERING, TEST DESIGN AND THE BUSINESS ASPECTS OF PROJECT MANAGEMENT. MUCH OF THE CURRENT TRAINING IS "OJT" WITH LIMITED FORMAL TRAINING IN THE TECHNOLOGY OF THE T&E PROCESS. ADDITIONAL TRAINING IS NEEDED IN TEST DESIGN, MEASUREMENT AND INSTRUMENTATION, DATA REDUCTION ANALYSIS, INTERPRETATION AND THE USE OF MODELS. IN ADDITION, ALL PERSONNEL ASSIGNED TO T&E DUTIES SHOULD BE REQUIRED TO ATTEND AN IMPROVED VERSION OF THE T&E MANAGEMENT COURSE SIMILAR TO THAT NOW CONDUCTED BY THE DEFENSE SYSTEMS MANAGEMENT COLLEGE. PORTIONS OF THE COURSE MATERIALS FROM THE PILOT INTERN TRAINING PROGRAM FOR CIVILIAN PERSONNEL (SEE APPENDIX) SHOULD BE MADE AVAILABLE AS TRAINING MODULES FOR ALL T&E PERSONNEL.

ACQUISITION T&E PROGRAMS ARE IMPORTANT TO REGAINING THE ARMY'S CREDIBILITY WITH CONGRESS. THE ARMY SHOULD PROVIDE THE MECHANISMS AND INCENTIVES TO PUT IN PLACE AND RETAIN QUALITY INDIVIDUALS SPECIALIZING IN T&E IMPLEMENTATION. CURRENTLY, MILITARY PERSONNEL DO NOT SEE PARTICIPATION IN THE T&E PROCESS AS CAREER ENHANCING. THOSE WHO ATTEMPT TO SPECIALIZE IN T&E WITHOUT THE NECESSARY ARMY COMMAND EXPERIENCE HAVE LITTLE OPPORTUNITY FOR ADVANCEMENT OR PROMOTION. THE REQUIREMENT FOR COMMAND EXPERIENCE, HOWEVER, REMOVES THESE INDIVIDUALS FROM THE TECHNICAL AREA AND OFTEN CAUSES THEM TO LEAVE PROGRAMS AND PROJECTS AT CRITICAL TIMES IN THE PROGRAM DEVELOPMENT LIFE CYCLE. WHILE THE SES PROGRAM HAS PROVIDED AN OPPORTUNITY FOR

#### DISCUSSION OF ISSUE #4: TEST AND EVALUATION PERSONNEL POLICIES

##### **BACKGROUND (CON'T)**

CIVILIAN PERSONNEL, THE CAREER SYSTEM FOR MILITARY PERSONNEL IS NOT WELL DEFINED. OPERATIONAL TESTING SHOULD ALWAYS BE THE DOMAIN OF THE MILITARY. THE ARMY SHOULD MODIFY ITS PERSONNEL POLICY ACCORDINGLY. PERHAPS THE PROPOSAL BY AMC TO RESTRUCTURE THE MISSION AREA MATERIEL PLAN PROGRAM (SEE APPENDIX) COULD BE THE BASIS FOR FURTHER MILITARY PERSONNEL DEVELOPMENT.

PROVIDING STABILITY WITHIN THE ARMY IN TERMS OF PROGRAMS, DOLLAR RESOURCES, AND PERSONNEL RESOURCES WOULD GREATLY IMPROVE THE T&E PROCESS. ALTHOUGH EXTERNAL FORCES SUCH AS CONGRESSIONAL AND OSD INFLUENCE DIRECTLY AFFECT PROGRAMS AND DOLLAR RESOURCES, THE ARMY DOES HAVE MUCH GREATER RELATIVE CONTROL OVER IT'S PERSONNEL POLICIES. THE EFFECTS OF TURBULENCE IN PROGRAMS AND FUNDING ARE MADE WORSE BY THE TURNOVER OF INDIVIDUALS. PERSONNEL INSTABILITY DURING THE PROGRAM LIFE CYCLE DEVELOPMENT AND PARTICULARLY AT CRITICAL T&E POINTS, ADVERSELY AFFECTS THE T&E PROCESS. YOUNG, INEXPERIENCED OFFICERS INJECTED INTO THE PROCESS FOR SHORT PERIODS OF TIME IN CRITICAL ROLES MAY CAUSE SERIOUS PROBLEMS IN THE MANAGEMENT OF PROGRAMS. THE RETENTION OF CORPORATE MEMORY THROUGH PERSONNEL STABILITY IS A KEY ISSUE IN IMPROVING THE EFFICIENCY AND QUALITY OF THE T&E PROCESS.



## ISSUE #5: ROLE OF CONTRACTOR

### **ISSUE**

THE ARMY SHOULD BETTER UTILIZE CONTRACTOR DATA, EXPERTISE, AND FACILITIES IN THE TESTING PROCESS WHILE KEEPING THE EVALUATION PROCESS INDEPENDENT.

### **FINDINGS**

- o A NUMBER OF EXAMPLES WERE ENCOUNTERED OF THE ARMY REPLICATING THE COLLECTION OF DATA, CREATING REDUNDANT GOVERNMENT FACILITIES, AND OTHERWISE DUPLICATING CAPABILITIES COSTLY TO CREATE WHICH ARE ALREADY AVAILABLE FROM CONTRACTORS.
- o THE RECENT LAW (PL 99-661) AFFECTING OT&E HAS CREATED CONCERN OVER THE PROPER ROLE OF CONTRACTORS, AND USE OF CONTRACTOR CAPABILITIES.
- o PL 99-661 IS TOO RESTRICTIVE ON THE PROPER USE OF SYSTEM CONTRACTORS.
- o THE ARMY TESTING COMMUNITY MAKES EXTENSIVE USE OF SUPPORT CONTRACTORS. THIS IS NOT AFFECTED BY PL 99-661.
- o IT IS DESIRABLE FOR ARMY TEST ORGANIZATIONS TO CONTINUE TO SOLICIT THE SYSTEM CONTRACTORS' COMMENTS ON THE TEST MASTER PLAN, TEST ISSUES AND CRITERIA, AND DETAILED TEST PLANS.
- o IT IS SOMETIMES EFFECTIVE AND APPROPRIATE FOR THE ARMY TO USE SYSTEMS CONTRACTING SUPPORT (e.g., LOGISTICS, MAINTENANCE, INSTRUMENTATION) DURING OT&E. THIS IS CURRENTLY PROHIBITED BY PL 99-661, EXCEPT WHEN SUCH SUPPORT IS A PART OF THE WAY THE SYSTEM WILL BE DEPLOYED.

ISSUE #5: ROLE OF CONTRACTOR

**RECOMMENDATIONS**

- o THAT THE AAE DEVELOP AND PROPOSE TO OSD, A POSITION TO BE DISCUSSED WITH CONGRESS FOR:
  - AN INTERPRETATION OF THE LAW (PL 99-661), OR A CHANGE TO THE LAW, WHICH WOULD ALLOW SYSTEM CONTRACTOR PARTICIPATION IN ANY OT&E ACTIVITY, EXCEPT DIRECT SCORING, DEEMED ESSENTIAL. THE APPROVAL OF SYSTEM CONTRACTOR PARTICIPATION IN OT&E SHOULD BE APPROVED AT THE AAE LEVEL.
- o THE OVERALL T&E MANAGER SHOULD TAKE EXPLICIT STEPS TO MAXIMIZE THE USE OF THE CAPABILITIES OF CONTRACTORS, INCLUDING SYSTEMS CONTRACTORS IN TEST PACKAGES/INSTRUMENTATION, ANALYTIC ANALYSIS OF TEST FAILURES, AND MAINTENANCE CAPABILITIES.

## DISCUSSION OF ISSUE #5: ROLE OF CONTRACTOR

### **BACKGROUND**

PL 99-661 WAS PASSED BY CONGRESS IN 1986 AND THIS LAW RESTRICTS THE ROLE OF THE SYSTEMS CONTRACTOR IN THE T&E PROCESS. THE LAW APPLIED TO ALL OF THE ARMED SERVICES. THE CONGRESS IS CONCERNED THAT A SYSTEM CONTRACTOR MAY UNDULY INFLUENCE A SERVICE IN EITHER THE SELECTION PROCESS OR IN THE PERFORMANCE OF A WEAPONS SYSTEM. IN ORDER TO CONTROL THE ROLE OF THE SYSTEM CONTRACTOR CONGRESS PASSED PL 99-661 WHICH MAY BE UNDULY RESTRICTIVE AND MAY LIMIT CONTRIBUTIONS THAT THE SYSTEM CONTRACTOR MAY OR SHOULD MAKE. SINCE THE LAW APPLIES TO ALL SERVICES IT IS DESIRABLE THAT ALL SERVICES HAVE A COMMON UNDERSTANDING AS TO THE APPLICATION OF THE LAW.

BECAUSE THE LAW IS RESTRICTIVE BEYOND WHAT IS NECESSARY TO KEEP THE SYSTEM CONTRACTOR FROM INFLUENCING THE SCORING IT IS OUR OPINION THAT THE LAW SHOULD BE MODIFIED OR THAT THE ARMED SERVICES COMMITTEE PROVIDE AN INTERPRETATION OF THE LAW THAT ALLOWS FOR PRUDENT USE OF THE SYSTEM CONTRACTOR.

THE LAW PL 99-661 STATES "NO PERSON EMPLOYED BY THE CONTRACTOR FOR THE SYSTEM BEING TESTED MAY BE INVOLVED IN THE CONDUCT OF THE OPERATIONAL TEST AND EVALUATION".

5 JANUARY 1987 LETTER TO SECRETARY WEINBERGER FROM THE ARMED SERVICES COMMITTEE - ASPIN/GOLDWATER STATES "WE WOULD EXPECT THAT VERY FEW, IF ANY, CONVENTIONAL COMBAT SYSTEMS AS DEFINED IN PL 99-661 WILL ENTAIL SUCH POST-DEVELOPMENT CONTRACTORS INVOLVEMENT. THUS, FEW, IF ANY, OPERATIONAL TESTS WILL ENTAIL ANY SORT OF SYSTEM CONTRACTOR PARTICIPATION".

LETTER 14 JANUARY 1988 TO VICE CHIEF OF STAFF ARMY AND UNDER SECRETARY OF THE ARMY FROM MG DRUMMOND, FORMER COMMANDER OTEA, STATES "PL 99-661. THIS PUBLIC LAW PLACES STRINGENT RESTRICTIONS ON CONTRACTOR PARTICIPATION DURING AND IN THE HANDLING OF THE DATA FROM OPERATION TESTING. THIS IS A LAW WHICH IS WELL-INTENDED AND ON ITS FACE MAKES GOOD SENSE. THE INTENT IS TO INSURE THAT SYSTEMS ARE SUPPORTED DURING TEST AS THEY WILL BE

## DISCUSSION OF ISSUE #5: ROLE OF CONTRACTOR

### **BACKGROUND (Con't)**

WHEN FIELDED SO THAT ACCURATE SUPPORTABILITY ASSESSMENTS ARE MADE AND SO THAT THERE IS NO OPPORTUNITY TO MANIPULATE TEST DATA. EVERYONE HAS TO SUPPORT THESE AIMS ... THEY ARE MOTHERHOOD. NEVERTHELESS THE LAW IS SHORT SIGHTED IN THAT IT LEADS TO INCREASED TEST COSTS AND HAS THE PROBABILITY OF CAUSING US NOT TO GET MAXIMUM POSSIBLE VALUE OUT OF THE TESTS WE CONDUCT. AS EXAMPLES, WE NORMALLY DO NOT BUY ENOUGH INITIAL SYSTEMS TO FULLY IMPLEMENT THE SYSTEM'S LOGISTICAL CONCEPT DURING OPERATIONAL TEST. WE DO NOT NORMALLY FIELD AND TEST THE DS OR GS LEVELS OF MAINTENANCE; WE DO NOT PROVIDE WITH SPARE PARTS, ETC., UNTIL AFTER A PROCUREMENT DECISION. WE SELDOM TRAIN THE MAINTAINERS ABOVE THE ORGANIZATIONAL LEVEL IN THE INITIAL PRE-TEST TRAINING. TO FULLY COMPLY WITH THE LAW, THESE WOULD ALL BE REQUIRED AND THEY CARRY A PRICE TAG. ADDITIONALLY, A TREND IS DEVELOPING IN WHICH WE REQUIRE THE CONTRACTOR TO DELIVER THE SYSTEM FOR TEST WITH AN INSTRUMENTATION PACKAGE INCLUDED. THIS IS QUITE OFTEN UNIQUE INSTRUMENTATION FOR WHICH WE HAVE NO MAINTENANCE CAPABILITY. CONTRACTOR ACCESS, THEN SEEMS THE ONLY SOLUTION UNLESS WE WANT TO TRAIN A SOLDIER FOR A JOB HE'LL NEVER PERFORM EXCEPT DURING TEST. LASTLY, VERY OFTEN THE CONTRACTOR IS THE ONLY SOURCE FOR ROOT-CAUSE ANALYSES OF TEST FAILURES. WITHOUT THEIR ASSISTANCE IN ISOLATING FAILURE CAUSE AND IMPACT ON SYSTEM PERFORMANCE, SOME FAILURES CANNOT BE ADEQUATELY CORRECTED. THESE ARE BUT A FEW OF THE PROBLEMS WHICH COME WITH THE LAW. I WOULD URGE THAT A MORE LIBERAL INTERPRETATION BE AGGRESSIVELY URGED ON CONGRESS BY THE OT&E LEADERSHIP. WE HAVE SPOKEN TO DOT&E ON SEVERAL OCCASIONS ABOUT THIS; HOWEVER, I DO NOT BELIEVE A COHERENT ARGUMENT HAS BEEN PRESENTED TO THE CONGRESS. I BELIEVE THE INTEGRITY OF TESTING AND TEST DATA CAN BE PRESERVED EVEN IF THE CONTRACTOR IS ALLOWED MORE PARTICIPATION."

IT IS ESSENTIAL THAT THE ARMY GET AS MUCH VALUE AS IT CAN OUT OF MONIES EXPENDED. TO THIS END IT IS BENEFICIAL TO THE ARMY TO UTILIZE AS MUCH AS POSSIBLE DATA, EXPERIENCE, INSTRUMENTATION, MODELS, AND OTHER FACILITIES, GENERATED BY CONTRACTORS UNDER ARMY CONTRACT.

## DISCUSSION OF ISSUE #5: ROLE OF CONTRACTOR

### BACKGROUND (Con't)

IN VISITING SEVERAL COMMANDS VIEWS WERE EXPRESSED BY A NUMBER OF OFFICIALS THAT, TO THE MAXIMUM EXTENT POSSIBLE, THE ARMY SHOULD REPLICATE IN-HOUSE AS MUCH EXPERTISE, TOOLS, ETC., AS THEIR CONTRACTORS HAVE. ALSO THAT THE ARMY SHOULD BUILD ITS OWN MODELS RATHER THAN USE THOSE GENERATED BY CONTRACTORS DURING THEIR COURSE OF WORK BECAUSE A CONTRACTOR MODEL MAY BE BIASED, AND A GOVERNMENT ANALYST CANNOT UNDERSTAND ADEQUATELY A MODEL UNLESS HE BUILDS IT. THERE ARE ALSO TEST FACILITIES SUCH AS INFRA-RED RANGES, ANECHOIC CHAMBERS, ETC., BUILT BY THE ARMY WHICH PERHAPS COULD HAVE BEEN DELIVERED TO THE GOVERNMENT BY A CONTRACTOR BECAUSE THE CONTRACTOR HAD TO BUILD SUCH FACILITIES DURING THE COURSE OF A PROGRAM, OR THE GOVERNMENT COULD USE CONTRACTOR FACILITIES RATHER THAN REPLICATING THEM.

THESE PRACTICES ARE INCONSISTENT WITH THE OBJECTIVE STATED ABOVE. THERE ARE NUMEROUS EXAMPLES IN THE SERVICES (CONTRACTOR-GOVERNMENT RELATIONSHIPS IN FIGHTER AIRCRAFT PROGRAMS, STRATEGIC WEAPONS PROGRAMS) WHERE SUCH USE OF CONTRACTOR GENERATED CAPABILITY ARE SUCCESSFULLY USED. THE ARMY COULD DO MORE IN THIS VEIN AND REDUCE ITS EXPENDITURES ON SOME ASPECTS OF TEST ACTIVITIES.

### EXAMPLES OF DUPLICATION/FAILURE TO USE

IN DISCUSSION AT MICOM IT WAS POINTED OUT THAT SOMETIME FACILITIES WERE DUPLICATED BY THE ARMY WHEN A CONTRACTOR HAD EXISTING FACILITIES BECAUSE THE ARMY WAS UNCERTAIN AS TO WHETHER THE CONTRACTOR WOULD GIVE AN UNBIASED REPORT. FOR EXAMPLE;

- o MICOM HAS A SIMULATION FACILITY BECAUSE IT SAYS IT CANNOT TRUST THE CONTRACTOR'S SIMULATION REPORTS.
- o RAYTHEON HAS AN ANECHOIC FACILITY AND THERE ARE MANY OTHER ANECHOIC FACILITIES IN BOTH IN THE ARMY AND IN INDUSTRY.

THE AIR FORCE ON THE F-15 AND THE F-18 HAS USED CONTRACTOR SIMULATION FOR TRAINING FIRST SQUADRON, PLANNING TEST MISSIONS, ETC. IN THE DESIGN OF THE LHX THE ARMY MIGHT CONSIDER THE USE OF CONTRACTORS SIMULATION FACILITY SUCH AS MCDONNELL DOUGLAS, SIKORSKY AND BELL.

AT TIMES, OTHER SERVICES POSSESS FACILITIES THAT MIGHT BE USED TO AVOID COST ASSOCIATED WITH DUPLICATION.

## ISSUE #6: FACILITIES & INSTRUMENTATION

### ISSUE

INCREASED COMPLEXITY OF ARMY MATERIEL SYSTEMS REQUIRES TESTING FACILITIES AND INSTRUMENTATION WITH IMPROVED CAPABILITIES.

### FINDINGS

- APPROVAL OF AN O&O PLAN, A ROC, AND A TEMP FOR A NEW ARMY MATERIEL SYSTEM INCLUDES AN IMPLICIT ASSUMPTION THAT NECESSARY FACILITIES AND INSTRUMENTATION FOR TESTING WILL BE AVAILABLE WHEN REQUIRED.
- INSTABILITY OR DECOUPLING IN DEDICATED RESOURCES FOR T&E, TO INCLUDE FUNDS, PERSONNEL, FACILITIES, AND INSTRUMENTATION SUITES, OFTEN PRECLUDES GUARANTEES OF AVAILABILITY OF TESTING RESOURCES WHEN REQUIRED.
- TESTING OF ARMY SYSTEMS WITH FACILITIES AND INSTRUMENTATION SUITES NOT ADEQUATE TO THE TASK MAY WELL COMPROMISE THE APPLICABILITY AND CREDIBILITY OF THE RESULTS.
- AVAILABILITY OF IMPROVED TEST INSTRUMENTATION SUITES APPLICABLE TO MULTIPLE PROGRAMS HAS THE POTENTIAL FOR REDUCING PERSONNEL REQUIREMENTS, INCREASING TEST EFFICIENCY, AND REDUCING THE LENGTH OF THE ACQUISITION CYCLE.
- COORDINATION OF THE ACQUISITION CYCLE OF T&E FACILITIES AND INSTRUMENTATION SUITES WITH THAT OF THE SYSTEM TO BE TESTED WOULD IMPROVE LINKAGES BETWEEN TESTING SCHEDULES AND AVAILABILITY OF REQUIRED INSTRUMENTATION.
- AN ARMY MANAGEMENT CONTROL POINT TO COORDINATE AND INTEGRATE ALL ARMY T&E INSTRUMENTATION REQUIREMENTS WOULD HELP TO ASSURE AVAILABILITY OF REQUIRED RESOURCES AND AVOID UNNECESSARY ARMY OR SERVICE DUPLICATION.

ISSUE #6: FACILITIES & INSTRUMENTATION

**RECOMMENDATIONS**

- ASA(RDA), AMC AND TRADOC PLANS AND BUDGETS INCLUDE IDENTIFICATION OF TOTAL REQUIRED FACILITIES AND INSTRUMENTATION RESOURCES FOR ALL T&E ACTIVITIES, AND SCHEDULING OF THESE RESOURCES IN APPROPRIATE FISCAL YEARS.
- ASA(RDA), AMC AND TRADOC, IN THEIR YEARLY BUDGET ALTERATIONS, ASSURE MINIMUM FACILITIES AND INSTRUMENTATION T&E RESOURCES REQUIRED IN THAT FISCAL YEAR ARE RETAINED FOR ALL MATERIEL SYSTEMS IN THE PIPELINE, OR DELAY THOSE MATERIEL SYSTEMS FOR WHICH ADEQUATE FACILITIES AND INSTRUMENTATION T&E RESOURCES ARE NOT AVAILABLE.
- DA DESIGNATE A MANAGEMENT CONTROL POINT FOR COORDINATION AND INTEGRATION OF ALL ARMY T&E INSTRUMENTATION REQUIREMENTS APPLICABLE TO MULTIPLE PROGRAMS.

## DISCUSSION OF ISSUE #6: FACILITIES & INSTRUMENTATION

### **BACKGROUND**

TEST TECHNOLOGY IS BECOMING INCREASINGLY CRITICAL TO THE WEAPONS SYSTEM ACQUISITION PROCESS (CHART). ADVANCES IN WEAPONS TECHNOLOGY CREATE GREATER RELIANCE ON TESTING TO DEMONSTRATE SOUNDNESS OF DESIGN AND THE SYSTEM'S OPERATIONAL EFFECTIVENESS/SUITABILITY, AND LOGISTIC SUPPORTABILITY. JUST AS WEAPON SYSTEMS' TECHNOLOGY BECOMES COMPLEX, THE TECHNOLOGY REQUIRED TO TEST THESE SYSTEMS IS BECOMING MORE COMPLEX -- MORE HIGH TECH AND MORE EXPENSIVE. THE PACE IN THE GROWTH OF TEST TECHNOLOGY IS SIGNIFICANT. IT APPEARS THE ARMY IS MAKING SOME EFFORT TO DEVELOP NEW TEST CAPABILITIES, BUT THE PACE IS OUT-OF-STEP WITH WEAPON SYSTEMS DEVELOPMENT.

A TEST SUITE IS A COLLECTION OF RELATED INSTRUMENTATION CONFIGURED FOR COMPREHENSIVE TECHNICAL AND/OR OPERATIONAL TESTING OF NEW TECHNOLOGY WEAPONS OR SYSTEMS IN A SPECIFIC TECHNOLOGICAL AREA. INSTRUMENTATION TYPICALLY CONSISTS OF NEW EQUIPMENT DEVELOPED FOR THE ACCOMPLISHMENT OF HIGH TECHNOLOGY TESTING. REQUIREMENTS FOR FIVE HIGH TECHNOLOGY TEST SUITES WERE TO BE ESTABLISHED IN WEAPONS SYSTEMS BUDGETS (I.E., FUNDED BY THE APPROPRIATE MISSION AREA MANAGER). FUNDING AND COMMITMENT TO THESE EFFORTS APPEAR TO BE MORE PERFUNCTORY THAN SUBSTANTIVE AT THIS TIME.

THE TIME FACTOR HAS BECOME INCREASINGLY CRITICAL. SOME INSTRUMENTATION/TARGET UPGRADE PROGRAMS HAVE BEEN FUNDED; BUT, THE PROGRAM SCHEDULES HAVE BEEN STRETCHED OUT TO ACCOMMODATE AVAILABLE FUNDING. THE LACK OF FOCUS AND EMPHASIS ON THE DEVELOPMENT OF TEST TECHNOLOGY WILL HAVE A SERIOUS, ADVERSE IMPACT ON FUTURE TESTING; PARTICULARLY, AS THE ARMY MOVES TO FORCE STRUCTURE TESTING IN WHICH A FAMILY OF SYSTEMS (E.G., FAADS) IS TESTED RATHER THAN A SINGLE SYSTEM. TESTING OF THESE FAMILIES OF SYSTEMS REQUIRES NEW, INNOVATIVE APPROACHES -- TEST SUITES COMPRISING TEST METHODOLOGIES AND INSTRUMENTATION MUST BE HARMONIZED TO PROVIDE A TOTAL CAPABILITY TO TEST.



## DISCUSSION OF ISSUE #6: FACILITIES AND INSTRUMENTATION

### BACKGROUND (Cont'd)

TEST TECHNOLOGY ITSELF INVOLVES AN ACQUISITION PROCESS THAT MUST BE LINKED TO THE WEAPONS ACQUISITION PROCESS -- i.e., TRIGGERED BY REQUIREMENTS EMANATING FROM THE WEAPONS ACQUISITION PROCESS. CHALLENGES TO THE ARMY ARE HIGHLIGHTED IN THE CHART.

### CHALLENGE OF THE 90's

- ARMY THRUSTS
  - AGGRESSIVE DEVELOPMENT/EXPLOITATION OF TECHNOLOGY-NEW MEASUREMENT REQUIREMENTS
  - SYSTEMS APPROACH-INTEROPERABILITY ISSUES
- NEW TESTING PHILOSOPHIES
  - REALISM-TARGETS, THREAT SIMULATORS
  - STRESS LOADING
  - VULNERABILITY
  - OPERATIONAL ISSUES-CASUALTY ASSESSMENT, RESOURCES/SCENARIO GENERATION
- DEVELOPER AND EVALUATOR DEMANDS
  - MORE DATA
  - HIGHER ACCURACIES

THE ISSUE ENTITLED "ROLE OF CONTRACTOR" HAS INCLUDED IN ITS BACKGROUND STATEMENT SOME EXAMPLES OF DUPLICATION/FAILURE TO USE FOR TESTING FACILITIES AND INSTRUMENTATION OF CONTRACTORS IN COMPARISON TO THOSE OF THE ARMY. IN SUPPORT OF THE NEED FOR AN ARMY CONTROL POINT TO COORDINATE AND INTEGRATE ALL ARMY T&E INSTRUMENTATION REQUIREMENTS, THE FOLLOWING EXAMPLES OF POSSIBLE UNNECESSARY DUPLICATION MAY BE CITED:

- TECOM HAS AN INFANTRY ANTI-TANK RANGE AND NOW MICOM HAS BUILT SUCH A RANGE.
- EGLIN AFB HAS A FACILITY, WITH A TOWER, FOR TESTING SMART MUNITIONS AND NOW MICOM IS BUILDING A SIMILAR FACILITY.

## SUMMARY OF KEY TEST AND EVALUATION RECOMMENDATIONS

- TRADOC FOCUS REQUIREMENTS PROCESS ON ESSENTIAL WARTIME OPERATIONAL CAPABILITIES, AND MAKE EARLY AND CONSTRUCTIVE USE OF CONCEPTUAL EXPERIMENTATION.
- THE ARMY ENFORCE MORE DISCIPLINE AND INCREASE SENIOR MANAGEMENT CONTRIBUTIONS IN IMPLEMENTING EXISTING ACQUISITION POLICIES AND PROCEDURES.
- DCSPER-HQDA DEVELOP AND IMPLEMENT A PERSONNEL STRATEGY THAT WILL ENABLE THE ARMY TO ATTRACT, TRAIN, REWARD AND RETAIN QUALITY CIVILIAN AND MILITARY T&E PERSONNEL.
- THE ARMY ESTABLISH POLICY AND IMPROVE CAPABILITY FOR THE USE AND SCHEDULING OF COMPUTER MODELS AND MANNED SIMULATION IN SUPPORT OF THE T&E PROCESS.
- THE ARMY EXPAND THE USE OF SYSTEM CONTRACTOR CAPABILITIES TO ACCELERATE TESTING, MINIMIZE COSTS, AND REDUCE FACILITY REDUNDANCY (POSSIBLY REQUIRING A CHANGE TO PL 99-661 FOR OT).
- THE ARMY DESIGNATE A MANAGEMENT CONTROL POINT FOR COORDINATION AND INTEGRATION OF ALL ARMY T&E INSTRUMENTATION REQUIREMENTS.

**APPENDIX A**  
**TERMS OF REFERENCE**



DEPARTMENT OF THE ARMY  
OFFICE OF THE ASSISTANT SECRETARY

WASHINGTON, DC 20310-0103

30 DEC 1987



Mr. Gilbert F. Decker  
President and Chief Executive Officer  
Penn Central Federal Systems Company  
1800 Diagonal Road  
Suite 500  
Alexandria, Virginia 22314-2840

Dear Mr. Decker:

You are requested to appoint a panel of 15-18 Army Science Board Members to conduct a Summer Study during 1988 on Army Testing. The study should address, as a minimum, the terms of reference (TOR) described below; however, the panel should consider the TOR as guidelines and not be inhibited from considering other issues regarding Army Testing that it deems as important.

I. BACKGROUND:

The Army has evolved its test program for material and systems over many years. On the surface, the program follows DOD guidelines, policies, and regulations. The program is really a "collection of programs", codified in many different Army documents and regulations. The ultimate objective of this ensemble of programs is to provide valid sets of test data, interpretations of test data, and evaluations of test data so that the Army can make sound decisions throughout the life cycle of a material program; these decisions range from early on testing during preliminary, feasibility design and development through operational testing to determine if a system or a product improvement to an existing system should be produced and fielded to "in-use" testing after fielding. Many resources (manpower, dollars, and organizations) are devoted to this process. In spite of this wealth of experience and "corporate knowledge", the Army has experienced a number of problems in the testing of major systems late in the process, during operational testing (OT). The future test programs of

the Army must not repeat these problems if the Army is to meet its essential development and acquisition objectives in the ever more challenging and austere defense economic environment of the next decade. The Army leadership (and indeed DOD, Executive Branch, and Congressional leadership) could benefit greatly from an objective, systematic assessment of the Army's overall test program(s).

## II. STUDY OBJECTIVES/TERMS OF REFERENCE

A. OBJECTIVES - The overall objectives of the study are:

(1) to provide the Army with an assessment of the philosophy, methodology, and effectiveness of its test program;

(2) to determine what the Army's test program should be to meet its material acquisition needs for the next decade;

(3) to recommend methodology (ies) in the conduct and quality of testing.

### B. TERMS OF REFERENCE

(1) What is the Army's current testing philosophy and testing policy?

(a) What is the basis for the Army's testing philosophy and policy?

(b) Is it consistent with development/acquisition policies?

(c) Are the implementing instructions and directives consistent with policy, clear, and realistic?

(2) What is the Army's current process for test planning?

(a) When does test planning begin within the "womb-to-tomb" cycle?

(b) Is the Test & Evaluation Master Plan (TEMP) an effective vehicle for carrying through with minimum, essential testing? Is there change control discipline that allows for flexibility as requirements evolve?

(c) Does the test plan approval process provide for high quality and knowledgeable technical participation?

(3) What is the Army's current process for test plan implementation and conduct of testing?

(a) Are there test organizations with clearly stated authorities and missions?

(b) What are the respective roles of test agencies development agencies, procurement agencies, life-cycle support agencies, and contractors in the conduct of testing?

(c) Are the methodologies and technologies (procedures, data processing techniques, modeling and simulation techniques, etc.) used in the conduct of testing up to date?

(4) Control and use of data, interpretations, and evaluations.

(a) How are data requirements established?

(b) How are data validated? Are predictive models used and variances to actual data explained by both statistical and engineering analysis?

(c) How are test data used in the decision process?

(d) Are decision "ground rules" established and adhered to?

(5) Based on the analysis and review of the first four terms of reference, what specific actions must the Army take to insure a sound test program for the coming decade?

The study is not expected to be classified, although certain material up to DOD Secret may be briefed. The study is expected to require visits to and briefings by several Army RD&E Centers, AMC headquarters, TRADOC headquarters and agencies, development test agencies, operational test agencies, field user commands, OTEA, and senior leaders within Department of the Army.

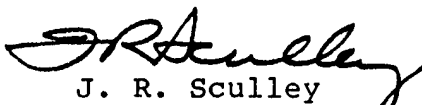
LTG Donald S. Pihl, Military Deputy to the Assistant Secretary of the Army (Research, Development and Acquisition), will be the Department of the Army sponsor for this study. Mr. Walt Hollis, the Deputy Under Secretary of the Army, Operations Research; Mr. Keith A. Myers, Director, USA Materiel Systems Analysis Activity, Aberdeen Proving Ground, MD; MG Robert L. Drudik, CG, USA, TRADOC Combined Arms Test Activity, Fort Hood, TX; MG Charles F. Drenz, CG USA Test and Evaluation Command, Aberdeen Proving Ground, MD; and MG Jerome B. Hilmes, CG Operational Test and Evaluation Agency, Falls Church, VA will serve as senior advisors. MG August M. Cianciola will serve as the Cognizant Deputy. COL Hezekiah M. Richardson, Office of the Assistant Secretary for Research, Development and Acquisition, will serve as Staff Assistant.

The group should begin its work immediately and conclude the effort at the 10-day summarization and report writing session scheduled for 18-28 July 1988 at the National Academy of Sciences Study Center, Woods Hole, MA.

It is not anticipated that your inquiry will go into any "particular matters" within the meaning of Section 208 of Title 18, United States Code.

A-5

Sincerely,

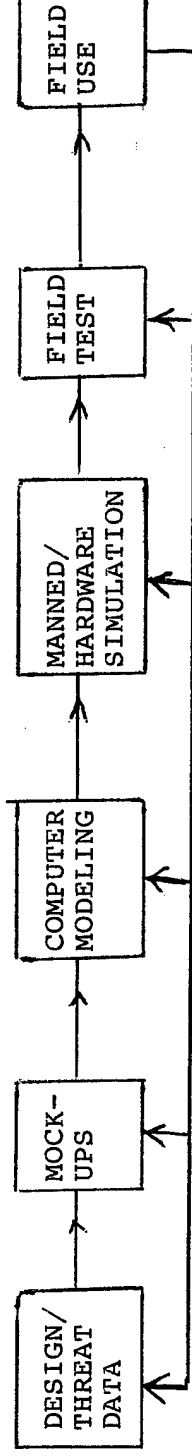


J. R. Sculley  
Assistant Secretary of the Army  
(Research, Development and Acquisition)

## APPENDIX B

### MODELING AND SIMULATION

Validated computer models and manned simulations, used together, should be a continuous and integral part of the t&e process and validation. The process encompasses at least the following elements and feedback loops:



Robust computer models and realistic manned/hardware simulations (whole or part-task) have some of the following advantages when used as a part of T&E:

1. Employing combat simulators such as SIMNET-D allow early user examination of concepts, doctrine, and tactics before designs are firm.
2. Permitting manned simulations with mock-ups and early prototype hardware.
3. Circumventing safety, security, and environmental constraints.
4. Identifying critical issues for field test.
5. Providing a vehicle for rapid screening and evaluation of design changes.
6. Training soldiers and evaluators and supporting field tests.
7. Providing a mechanism for introducing data from animal testing (blast, noise, NBC, etc.).
8. Providing continuity of the T&E process where organizational and functional barriers now exist (TT/OT, test and evaluation, Army/contractor, AMC/TRADOC/OTEA).
9. Permitting more test repetition and thus improve measurement, data handling and reduction, and statistical confidence levels.



## APPENDIX B (Con't)

10. Providing highly visible and understandable demonstrations (simulations) of system capability to decisionmakers.
11. Providing cost and schedule savings when combined, during design, with training simulators.

The need for alternate (particularly operational) testing methods will increase as the Army moves to more advanced technology systems involving networks, electro-optics, and exotic sensors and weapons. In some cases, simulations may be the only feasible test, e.g., when there is no way to test fully as with ASAS where sensors and interfaces cannot be activated in peacetime for security and other reasons. This applies also when many operators, many vehicles and trials are desired.

Simulations sometimes can be embedded in a system to support field testing. As an example, the Direct Fire Simulator for Real-time Casualty Assessment (RTCA) along with computer modeling was used for the Advanced Aerial Scout Test. When embedded training features are incorporated in systems under test, they may have potential T&E uses, especially when realistic target, EW, and scoring features are available.

The following are some references with brief annotations on the use of modeling and simulation:

1. DOD SIMULATIONS: Improved Assessment Would Increase the Credibility of Results. Washington, D.C.: GAO/PEMD-88-3, 1987.  
This report reviews the use of several computer models that supported the Army development and operational test for DIVAD and Stinger. The GAO found (1) that each simulation had strong points but "...there were limitations that degraded their credibility severely enough to question their usefulness.", and (2) there was "...limited evidence of efforts to validate simulation results...".
2. Parsons, H.M., Man-Machine System Experiments. Baltimore: Johns Hopkins Press, 1972.  
Reviews more than 200 system experiments involving field test, simulation, and modeling. This is an excellent source with an extensive bibliography and guides to methodology.

## APPENDIX B (Con't)

3. Jones, E.R., R.T. Hennessy, and S. Deutsch, Human Factors Aspects of Simulation. Washington, D.C.: National Academy Press, 1984.  
Although this report emphasizes simulation for training, it covers other uses, including engineering and research, along with other considerations such as physical fidelity, performance measurement, experimental design, and embedded concepts.
4. Aeronautical Technology Possibilities for 2000: Report of a Workshop. Washington, D.C.: National Academy Press, 1984.  
This report provides a basis for planning future aeronautical research and technology programs and identifying test facilities and capabilities for these programs. Areas of specific interest are human performance modeling; human and system performance measurement methodology; and the use of engineering simulation, computer simulation, human performance modeling, and measurement in the support of crew station design.
5. Asiala, C.F. et al, Models of Maintenance Resource Interaction: Peacetime Operations. Brooks AFB, TX: AFHRL-TR-82-19, 1983.  
This report describes the use of maintenance manpower simulation models for the F-15 that used 400 performance measures and interacts spares, support equipment, and manpower for various operational scenarios and maintenance environments. Wartime surge was addressed in a later study.

**APPENDIX C**  
**ROLE OF CONTRACTOR**

**CONTRACTOR                      COMMENTS - POLICY - INTERPRETATION OF PL 99-661**

**APPENDIX**

- PL 99-661	LAW	
- LETTER	5 JANUARY 1987	SECRETARY WEINBERGER FROM L. ASPIN/B. GOLDWATER
- MEMO	13 JUNE 1988	KEITH MYERS TO R. KURTZ
- MEMO	13 JUNE 1988	LTG PIHL
- LETTER	14 JANUARY 1988	MG DRUMMOND
- MEMORANDUM	MINUTES OF 10 MARCH 1988	TEST AND EVALUATION COMMITTEE
	PTLOCK STATUS REPORT	-CONTRACTOR INVOLVEMENT
- MEMORANDUM	1-2- JUNE 1988	TEST AND EVALUATION SYMPOSIUM - J. KRINGS COMMENTS
- MEMORANDUM	6 JANUARY 1988	W. HOLLIS
- MEMORANDUM	12 JANUARY 1988	W. HOLLIS
- MEMORANDUM	17 FEBRUARY 1988	MG HILMES TO W. HOLLIS

"2365. Competitive prototype strategy requirement: major defense acquisition programs."

(b) **EFFECTIVE DATE.**—Section 2365 of title 10, United States Code (as added by subsection (a)(1)), shall apply to major weapons systems (as defined in subsection (c)(1) of such section) that enter the advanced development stage after September 30, 1986.

**SEC. 910. TESTING OF CERTAIN WEAPON SYSTEMS AND MUNITIONS**

(a) **SURVIVABILITY AND LETHALITY TESTING AND OPERATIONAL TESTING.**—(1) Chapter 139 of title 10, United States Code, is amended by adding after section 2365 (as added by section 909) the following new section:

"§ 2366. Major systems and munitions programs: survivability and lethality testing; operational testing

"(a) **REQUIREMENTS.**—The Secretary of Defense shall provide that—

"(1) a covered system may not proceed beyond low-rate initial production until realistic survivability testing of the system is completed in accordance with this section;

"(2) a major munition program or a missile program may not proceed beyond low-rate initial production until realistic lethality testing of the program is completed in accordance with this section; and

"(3) a major defense acquisition program may not proceed beyond low-rate initial production until initial operational test and evaluation of the program is completed in accordance with this section.

"(b) **TEST GUIDELINES.**—(1) Survivability and lethality tests required under subsection (a) shall be carried out sufficiently early in the development phase of the system or program to allow any design deficiency demonstrated by the testing to be corrected in the design of the system, munition, or missile before proceeding beyond low-rate initial production.

"(2) In the case of a major defense acquisition program, no person employed by the contractor for the system being tested may be involved in the conduct of the operational test and evaluation required under subsection (a).

"(3) The costs of all tests required under that subsection shall be paid from funds available for the system being tested.

"(c) **WAIVER AUTHORITY.**—The Secretary of Defense may waive the application of the survivability and lethality tests of this section to a covered system, munitions program, or missile program if the Secretary, before the system or program enters full-scale engineering development, certifies to Congress that live-fire testing of such system or program would be unreasonably expensive and impractical.

"(d) **WAIVER IN TIME OF WAR OR MOBILIZATION.**—In time of war or mobilization, the President may suspend the operation of any provision of this section.

"(e) **DEFINITIONS.**—In this section:

"(1) The term 'covered system' means a vehicle, weapon platform, or conventional weapon system—

"(A) that includes features designed to provide some degree of protection to users in combat; and

"(B) that is a major system within the meaning of that term in section 2302(5) of this title.

"(2) The term 'major munitions program' means—

"(A) a munition program for which more than 1,000,000 rounds are planned to be acquired; or

"(B) a conventional munitions program that is a major system within the meaning of that term in section 2302(5) of this title.

"(3) The term 'major defense acquisition program' means—

"(A) a conventional weapons system that is a major system within the meaning of that term in section 2302(5) of this title; and

"(B) is designed for use in combat.

"(4) The term 'realistic survivability testing' means, in the case of a covered system, testing for vulnerability and survivability of the system in combat by firing munitions likely to be encountered in combat (or munitions with a capability similar to such munitions) at the system configured for combat, with the primary emphasis on testing vulnerability with respect to potential user casualties and taking into equal consideration the operational requirements and combat performance of the system.

"(5) The term 'realistic lethality testing' means, in the case of a major munitions program or a missile program, testing for lethality by firing the munition or missile concerned at appropriate targets configured for combat.

"(6) The term 'configured for combat', with respect to a weapon system, platform, or vehicle, means loaded or equipped with all dangerous materials (including all flammables and explosives) that would normally be on board in combat.

"(7) The term 'operational test and evaluation' has the meaning given that term in section 138(a)(2)(A) of this title."

(2) The table of sections at the beginning of such chapter is amended by adding after the item relating to section 2365 (as added by section 909) the following new item:

"2366. Major systems and munitions programs: survivability and lethality testing; operational testing."

(b) **EFFECTIVE DATE**—Section 2366 of title 10, United States Code (as added by subsection (a)), shall apply with respect to any decision to proceed with a program beyond low-rate initial production that is made—

(1) after May 31, 1987, in the case of a decision referred to in subsection (a)(1) or (a)(2) of such section; or

(2) after the date of the enactment of this Act, in the case of a decision referred to in subsection (a)(3) of such section.

(c) **TIME FOR SUBMISSION OF ANNUAL REPORT OF DIRECTOR (OT&E)**—Subsection (g)(1) of section 138 of such title (as redesignated by section 101(a) of the Goldwater-Nichols Department of Defense Reorganization Act of 1986 (Public Law 99-433)) is amended by striking out "January 15" in the second sentence and all that follows through "is prepared" and inserting in lieu thereof "10 days after the transmission of the budget for the next fiscal year under section 1105 of title 31"

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## United States Senate

COMMITTEE ON ARMED SERVICES  
WASHINGTON, DC 20510-6080

January 5, 1987

Honorable Caspar W. Weinberger  
Secretary of Defense  
Washington, D.C. 20301

Dear Mr. Secretary:

In the Fiscal Year 1987 National Defense Authorization Act: (PL 99-661) Congress imposed a limitation on the involvement of contractor personnel in operational test and evaluation (OT&E) of major conventional systems designed for use in combat. Under this limitation, no personnel employed by the contractor for a system being tested "may be involved in the conduct of" the test or the evaluation of the results of that test.

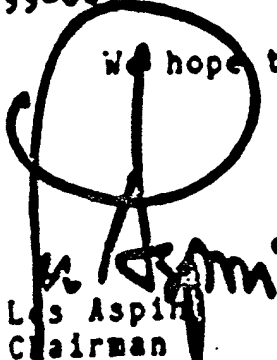
We understand that a clarification of the intent of this provision would be helpful to OSD and Service test agencies in planning for future OT&E. It is our intention to ensure that, during operational tests, weapon systems are operated, maintained, and otherwise supported by personnel typical of those who will carry out such duties when the system is deployed in combat. It is our further intention that the processing and evaluation of test data be carried out in a completely objective manner with no possibility or even the appearance of system-contractor manipulation.

Therefore, under the limitation established by PL 99-661, system-contractor personnel may be involved in an operational test only to the extent that is planned for them to be involved in the operation, maintenance, and other support of the system being tested when that system is deployed in combat. We would expect that very few, if any, conventional combat systems as defined in PL 99-661 will entail such post-deployment contractor involvement. Thus, few, if any, operational tests will entail any sort of system-contractor participation.

As for processing and evaluation of test data, we believe it is clear that system-contractor personnel are completely and properly excluded from such activities by the provisions of PL 99-661.

We hope that this clarification is helpful to you.

Sincerely,



Les Aspin  
Chairman  
House Committee on  
Armed Services



Barry Goldwater  
Chairman  
Senate Committee on  
Armed Services



OFFICE OF THE DIRECTOR  
US ARMY MATERIEL SYSTEMS ANALYSIS ACTIVITY

DATE 13 June 1988

Mr. Kurtz

I am enclosing a copy of the pertinent sections of PL 99-661, as requested. I have also enclosed a draft of a letter prepared for LTG Pihl's consideration, which reflects current staff thinking on Army implementation.

Unfortunately, there are no written summaries from the OSD T&E meeting panel on contractor participation. Generally, though, I heard the panelists all saying that there were instances where it would be difficult, if not impossible, to do without contractor participation if things were to be done in a rational way. Examples are where data collected into the systems need to be integrated into the systems under test or maybe even specifically designed for them and the maintenance of these instrumentation packages. Also, contractor participation makes sense in trying to diagnose system or component failures as to root cause.

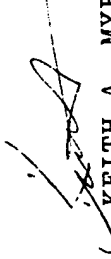
Mr. Kurtz

13 June 1988

My impression is that the Army intends to try to live with the letter of the law and both the Air Force and the Navy will try to get by living with the spirit of the law, but will continue to use contractor support where they see no alternative.

If you need more, call me at (301) 278-6614.

Atch

  
KEITH A. MYERS  
Director

Mr. Robert B. Kurtz  
Private Consultant  
542 Merwins Lane  
Fairfield, Connecticut 06430-1920



**DEPARTMENT OF THE ARMY  
OFFICE OF THE ASSISTANT SECRETARY  
WASHINGTON, DC 20310**

**SARD-ZB**

**13 June 1988**

**MEMORANDUM FOR: SEE DISTRIBUTION**

**SUBJECT: System Contractor Participation in Technical Test Scoring Conferences and Reliability, Availability, and Maintainability (RAM) Assessment Conferences**

1. The purpose of a scoring conference is to establish a test data base, assuring that a proper and consistent determination is made for categorizing test incidents against RAM requirements. This requires an understanding of the function lost, the consequences thereof on system mission accomplishment, and an understanding as to cause so that incidents can be properly categorized into hardware, software, operator error, maintenance error, manual deficiency, accident, etc.

2. It is thus recognized that scoring of test incidents must be accomplished with knowledge of cause and effect, and that the best source of much of this knowledge is the development/nondevelopmental item (NDI) system contractor. It is also recognized that this knowledge must be gleaned in such a manner as to avoid undue influence, or the perception of undue influence, by the system contractor on the scoring of test incidents by the scoring conference members. Undue influence can be avoided through proper conduct of the conference by a strong chairman; proper conduct implies that the system contractor provides information only when requested and limits discussion to the technical aspects of cause and effect. Unfortunately, the perception is not as easily avoided.

3. The following is the Army policy with regards to system contractor participation in technical test and evaluation activities:

"The participation of system contractor personnel at scoring conferences will depend on the type of conference being held - technical test (TT) or initial operational test and evaluation (IOTE). Since IOTE is conducted for purpose of testing under realistic field conditions, no person employed by the system contractor for the system being tested may be involved in the conduct of the IOTE, except to the extent they are involved in the operations, maintenance, and other support of the system when it is deployed. System contractor personnel will not be participants or observers at IOTE scoring conferences. Discussions with system contractor personnel may be necessary to ensure full technical understanding of test incidents; however, discussions with system contractor personnel will be held separate from the scoring conference. A formal written record will be kept by the project manager of all separate government/system contractor discussions of test incidents to include issues, system contractor positions, causal analysis, and any other pertinent data.

Normally, TT or technical testing is conducted to achieve reliability, availability, maintainability-durability (RAM-D) maturity and as such can only occur

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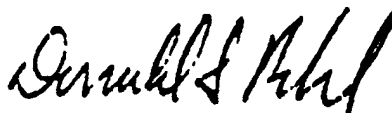
13 June 1988

SUBJECT: System Contractor Participation in Technical Test Scoring Conferences and Reliability, Availability, and Maintainability (RAM) Assessment Conferences

if the testing is designed to find, analyze, fix, and verify problems through representative testing in a timely manner. These factors suggest that engineering level discussions with system contractor personnel are encouraged/required. These discussions should, in general, take place prior to or during the scoring conference. Contractor personnel should NOT be physically present, however, during the formal voting/scoring period. The system contractors should speak primarily at the request of the material developer spokesman. The chairman will be responsible for maintaining reasonable participation by all observers.

In those TT cases where it is known that testing will be conducted under conditions similar (operation mode summary (OMS)/mission profile (MP), stresses, environmental conditions, test support, fixed, and same configuration) to IOTE, and an operational test is to be conducted during the same phase, the U.S. Army Operational Test and Evaluation Agency (OTEA) will notify the U.S. Army Materiel Command (AMC) that the TT results are to be combined with IOTE results. If agreed to by AMC, system contractor participation in the TT scoring conferences will be the same as for IOTE scoring conferences."

4. This policy applies to major acquisition programs only and will be reflected in Appendix C, paragraph C-9, entitled "Participation of System Contractor Personnel," in the ready for publication draft of the revised AR 702-3 (Army Materiel Systems Reliability, Availability, and Maintainability), and in AR 70-10 (Test and Evaluation), and AR 71-3 (User Test) in the near future. Addressees are expected to give this policy immediate and wide dissemination.



DONALD S. PIHL, Lieutenant General, USA  
Military Deputy to the  
Assistant Secretary of the Army  
(Research, Development and Acquisition)



DEPARTMENT OF THE ARMY  
UNITED STATES ARMY OPERATIONAL TEST AND EVALUATION AGENCY  
5600 COLUMBIA PIKE  
FALLS CHURCH, VIRGINIA 22041-5115

CSTE-ZA

14 January 1988

MEMORANDUM FOR:

VICE CHIEF OF STAFF, ARMY  
✓ UNDER SECRETARY OF THE ARMY

SUBJECT: Retiring Officer Comments

1. This memorandum is intended to provide end-of-tour/retiring officer comments by the undersigned who will retire as the Commanding General of OTEA after 32 1/2 years service effective 1 February 1988. In it, I wish to provide my personal views on several topics within the area of test and evaluation which I view as potentially troublesome and to present my personal assessment of the health of my command.

2. Potential/Continuing Problem Areas.

a. Determining System Readiness for Operational Test: A continuing problem for OTEA has been an accurate judging of systems' readiness to enter record operational testing. This becomes increasingly more critical in a time of dwindling resources as the poor showing of a system because it was not ready is wasteful and further, can cause premature termination of the program. It must become a first principle that we should not test any system before its time no matter what the pressures are to rush into test. The systemic factors in my opinion, which contribute to premature testing fall mainly into two categories: inadequate combat development test preparation and an inability to gauge software development status.

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(1) Combat Developments Test Preparation. On several occasions, (e.g., RPV, JTIDS, M1A1), the Army has entered testing without doing its force structure, tactics/doctrine and training homework. It seems patently obvious that dramatically new capabilities are going to be fought differently from systems they replace. New systems also will cause us to fight differently those complementary systems which they fall in beside. And for totally new systems, we must develop new doctrine. Despite this, we have gone into tests without examining beforehand the way we intend to do business. Force Development Tests and Experimentation (FDTE) during which we try out new tactics, organizational structures and command and control and measure the adequacy of training before testing for record should be the rule. General Thurman is working this theme within TRADOC and I feel we will show great improvement. Nevertheless, there will continue to be problems unless we strongly resist pressures to test by a schedule rather than by total system readiness.

CSTE-2A

SUBJECT: Retiring Officer Comments

(2) Software Development Status. Software-based systems are seldom adequately tested during engineering tests prior to operational test. What SW testing that is accomplished is most usually single-thread and not under stressful loads. Often independent verification and validation is not a part of the development strategy. Further, the metrics used during development focus on schedule and resource control rather than software quality. Consequently, these systems almost invariably bring surprises .... some show-stoppers ... during operational test. The development and test communities have tried several new approaches to avoid these problems. ASAS and MCS have used something called the "Software Readiness Verification Test" which would appear to be a misnomer since both systems passed these gates only to fail miserably during operational testing. On MSE, OTEA has expended unprecedented resources to track development, witness contractor in-plant tests, fight for more stressful loading of the system in the contractor's facility (even to the point of providing our FOIE instrumentation and traffic-loading devices) and to challenge contractor test results that do not appear as "rosey" as he reported. OTEA is not staffed for this degree of C2E in numbers or skills; we have utilized additional contractor support under our Omnibus contract but at a price tag of nearly \$1M. I believe that our efforts have made a difference; I see us going into MSE FOIE with high probability of success. But such an effort cannot be sustained. I can offer no solution to this problem; I do not believe quality cannot be tested into software. It must be designed and built a priori. Until it is, the Army can expect a continuing problem on these systems.

b. Test and Evaluation Master Plans (TEMP). The TEMP is supposed to detail a T&E road map for the system by defining a continuum of integrated contractor, engineering and operational testing. A TEMP, therefore, would appear to be an absolute necessity for a disciplined, orderly development. Surprisingly, by AMC count for the last TSARC, only about 1/3 of the 450+ systems under development have such a document. Approximately another third have a TEMP in draft form. For the others, TEMP-status is unknown. This is despite an AMC edict several years ago that no acquisition strategy would be approved without an accompanying TEMP. The lack of a TEMP carries obvious penalties: test activity work load cannot be programmed and scheduled with any accuracy; priorities for testing cannot be established; instrumentation cannot be planned accurately. The TSARC has attempted for the past year and a half to bring attention to and resolve the TEMP problem but without success. It is anticipated that this situation will get worse under the PEO system. Neither OTEA nor HQ AMC will have any visibility into the systems for which the PEO is the TEMP approving authority. A first order of business for the SARDA (with assistance from OTEA) should be to examine the staffing and coordination processes for TEMPs and make such changes as are necessary to provide HQDA and

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CSTE-ZA

SUBJECT: Retiring Officer Comments

OTEA cognizance of TEMP status. Along this line, there is a DOD requirement for annual review and update of TEMPs. No one is managing this for us and consequently, the Army is habitually late with revisions ... or is flat ignoring the requirement.

*James D. ... Jan 14, 1984*

c. PL 99-661. This public law places stringent restrictions on contractor participation during and in the handling of the data from operation testing. This is a law which is well-intended and on its face makes good sense. The intent is to insure that systems are supported during test as they will be when fielded so that accurate supportability assessments are made and so that there is no opportunity to manipulate test data. Everyone has to support these aims ... they are motherhood. Nevertheless the law is short sighted in that it leads to increased test costs and has the probability of causing us not to get maximum possible value out of the tests we conduct. As examples, we normally do not buy enough initial systems to fully implement the system's logistical concept during operational test. We do not normally field and test the DS or GS levels of maintenance; we do not provision with spare parts, etc., until after a procurement decision. We seldom train the maintainers above the organizational level in the initial pre-test training. To fully comply with the law, these would all be required and they carry a price tag. Additionally, a trend is developing in which we require the contractor to deliver the system for test with an instrumentation package included. This is quite often unique instrumentation for which we have no maintenance capability. Contractor access, then, seems the only solution unless we want to train a soldier for a job he'll never perform except during test. Lastly, very often the contractor is the only source for root-cause analyses of test failures. Without their assistance in isolating failure cause and impact on system performance, some failures cannot be adequately corrected. These are but a few of the problems which come with the law. I would urge that a more liberal interpretation be aggressively urged on Congress by the OT&E leadership. We have spoken to DOT&E on several occasions about this; however, I do not believe a coherent argument has been presented to the Congress. I believe the integrity of testing and test data can be preserved even if the contractor is allowed more participation.

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*Defence Office*

c. T&E Reorganization. I had high hopes that when the T&E Reorganization was approved in principle pending further definition and planning that we would move with some dispatch to do this work. This has not happened and I am concerned that unless all preliminaries can be finished prior to 15 April, a reorganization plan could not be ready for final approval within the time remaining for the current administration. Also, I do not believe that a reorganization as substantive as this can be designed, with processes defined and responsibilities documented, by part-time command representatives without authority who meet on an irregular schedule. The preparation of an adequate

CSTE-2A

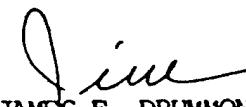
SUBJECT: Retiring Officer Comments

Evaluation Plan for a major system takes up to a year; a Test Design Plan requires 6-9 months. If reorganization were approved today, it could not be fully implemented until at least 1st Qtr, FY 90. This is an effort, in my opinion, which requires the full time attention of experts for a 45-60 day month period with a charter to develop their best possible product and a commitment from the commands involved to go along for the good of the Army no matter what "rice bowls" are affected.

3. Health of the Command. As I depart, I assess the overall health of OTEA as strong and mission-capable. We have a strong, increasingly-expert civilian work force who provide the institutional continuity. The authorization for seven additional GS-15 grades in 1986 was the best thing that has happened to the organization in years. It has provided increased opportunity for promotion and allowed us to hire a senior analyst for each of the evaluation divisions. The people we promoted or brought in have brought great benefit. The officer staffing is also excellent though comparatively it is not as experienced or expert as the civilian component. I have superb captains across the board, some truly outstanding majors, average lieutenant colonels for the most part and solid, competent and experienced colonels. We have had good success on first time selection to major but lesser success above that grade. OTEA must continue to receive high priority for the more technically and operationally competent officer. I have thought several times of the similarity of the OTEA mission, as your C2E watchdog, with that of the old AVice shop. We independently evaluate and provide you an assessment unbiased by the views of the staff or the developers. The difference is that the Weapon's System Evaluation portion of the AVice's office was staffed with the very brightest, most promising that the Army had. C2E is the way to go, I am convinced, but it will be only as good as the people in OTEA. Everything can't be "Priority 1" in this Army, I realize, but a better cut of middle grade officers is indicated.

C-13

4. I have truly enjoyed my time in OTEA and I thank you for the opportunity to serve you and the Army. This is a great Army and as I told General Vuono at my retirement ceremony, it has never been in better hands.

V.R.  
  
JAMES E. DRUMMOND  
Major General, USA  
Commanding



OFFICE OF THE SECRETARY OF DEFENSE

WASHINGTON D C 20301-1700

OPERATIONAL TEST  
AND EVALUATION

MEMORANDUM FOR DISTRIBUTION

SUBJECT: Minutes of the March 10, 1988, Test and Evaluation  
Committee (TEC) Meeting

The meeting agenda is at Attachment 1 and the list of  
attendees is at Attachment 2.

The TEC Chairman, Mr. Krings, discussed membership and  
participation at TEC meetings. Total TEC membership will  
include one senior official and an alternate appointed by each  
organization specified in the TEC Charter (Attachment 3).  
Permanent members, expected to attend all meetings will be JCS,  
ASD(C), DDDR&E, AF T&E Executive, Army T&E Executive, Navy T&E  
Executive and PA&E. Other members will be requested to attend  
when their areas of concern are subjects of discussion or they  
have issues to present.

Participation in TEC meetings will be limited to the  
principal member or his designated alternate. If an  
organization is not represented at two consecutive meetings it  
will be removed from the TEC. TEC meeting will be decision  
forums with detailed information provided in a read-ahead  
package when possible. C-14

Mr. Tyler provided a status report of two Live-Fire Test  
(LFT) Working Group efforts:

1. LFT Guidelines--A draft of the LFT Guidelines has been  
written and details are being finalized. Mr. O'Bryon will  
investigate whether the Test and Evaluation Master Plan (TEMP)  
is the proper forum for OSD approval of LFT test planning. The  
LFT Guidelines will be available for staffing in one month.
2. Improved LFT legislation--In addition to the LFT Guidelines  
review requested by the TEC, the working group has taken the  
initiative to propose improved LFT legislation. The working  
group will submit the improved legislative language to the TEC  
for approval and request that it be submitted to Congress in  
combination with the legislative language provided by the  
Contractor Involvement in OT Working Group. Mr. O'Bryon stated  
that OSD may not be in agreement with sending the package  
forward at this time since Congressional staff have indicated  
that this issue and related T&E issues would not be taken up in  
this session of Congress.



Dr. Kimmel provided a status report for the Realistic Testing/Modeling and Simulation Working Group (Attachment 4). In its first two meetings this group has provided definitions for realistic testing and modeling and simulation, formulated categories and areas of concern, and defined future activity, to include impact upon DoD policy, implementation strategy, and fostering DoD support.

Mr Pflock presented a status report for the Contractor Involvement in OT Working Group (Attachment 5). Conclusions are that the current language in 10 USC 2366 is unnecessarily and unrealistically restrictive, creating differences in Service implementation and causing all Services to be in violation of the law. Improved legislative language will be developed and presented to the ~~the TEC for future submission~~ to Congress.

Mr. Bolino provided an overview of the T&E budget (Attachment 6) showing little growth in the T&E budget in the past decade, although the RDT&E budget has almost doubled. The conclusion is that, in order to adequately support the acquisition process during a time of declining defense budgets, the T&E community needs to improve its ability to project the value of T&E support. Recommendations are that the TEC standardize Service terminology and budgeting procedures and take an active role in management of the allocation of T&E resources for the FY90 POM.

C-15

Mr. Krings announced the next TEC meeting which will be held on April 15, 1988 in Room 5D1033 from 1030-1130am. The topic will be the follow-up to Mr. Bolino's presentation on the T&E budget, to include FY90-94 T&E capability investment needs. Investment pace as well as funding approaches will be included as decision options, and a read-ahead package will be provided prior to the meeting.

Mr. Krings also announced that a T&E Symposium, hosted by DOT&E and DDDR&E(T&E), will be conducted June 1 and 2, 1988, in the Washington, D.C. area. The primary focus will be on T&E issues relating to acquisition programs, with topics to include TEMPs, LFT, and early OT assessments. The program will be primarily of interest to senior-level participants, with representation from various program offices and the field test community.



JOHN E. KRINGS  
Chairman

Attachments:  
As Stated

## **On Personnel**

Mr. Krings stressed that the number of personnel involved in operational testing must be reduced. He stressed the importance of computer-aided testing and suggested that a conference could be held on that subject in the future.

## **On Air Defense Threat Simulators**

Mr. Krings stated that there is much interpretation of what the threat simulators should be and there is a need to consolidate requirements. He said that we need "a comprehensive view" of what the threats are, the real threats, and the simulators. He stated that Congress is pushing for surrogate and simulated threats. He stressed that all three Services need to be involved in a joint effort because all have the same threat. He further stressed that the Services need to get an agreement on a common threat and common requirements.

## **On Contractor Involvement in OT**

Mr. Krings stated that we must take a reasonable approach to contractor involvement in OT. He stated that first of all, we had to realize that the contractors developed and produced the product, and we are dealing with very sophisticated systems today. He stressed that we cannot afford to unnecessarily duplicate sophisticated instrumentation systems and data processing algorithms. Mr. Krings emphasized that the contractor should be allowed limited participation as long as assurances are made that the contractor cannot alter the test outcome, or the data, or how the test is conducted. C-116

## **In the Support Area**

Mr. Krings stressed that we must improve ourselves in the support area to testing. We must become more efficient by instrumenting systems. We cannot afford to pay a tester to monitor a TV screen if we can automate data collection for that parameter.

In the area of data crunching, Mr. Krings suggested sharing capability. He stated, "Don't go to test without first going through the simulation and modeling."

He asked the audience, "How many places do we test the same thing?" He then tasked the audience to look at test communications to find out who is efficient and who is not. He stressed getting rid of the duplicate sites and reducing the number of people for testing involvement. He stressed automated systems. "Use computer-aided testing - make a brilliant tester."

## **On Privitization**

Mr. Krings stated that the government has limited license, and that they have to figure out ways to make things cheaper, especially in the testing arena. One of the ways to do this is to



DEPARTMENT OF THE ARMY  
OFFICE OF THE UNDER SECRETARY  
WASHINGTON, D.C. 20310-0102

6 January 1988

SAUS-OR

MEMORANDUM FOR: COMMANDING GENERAL, US ARMY OPERATIONAL TEST  
AND EVALUATION AGENCY

SUBJECT: Scoring Conferences and Data Collection Procedures

The recent report of the Defense Department Inspector General on the subject of the Aquila Operational Test has identified weaknesses in our operational test policies and procedures for dealing with personnel in the employ of the contractor whose system is undergoing test. These weaknesses were also identified by the GAO in their report of the same operational test.

On 9 October 1987 I provided oral guidance to MG Drummond which pertained to the discussions with contractor personnel of test incidents occurring in the FAADS LOS-F-H Test. That guidance is reflected in two messages transmitted by OTEA, copies of which are enclosed. This policy guidance is to be Army policy for all scoring conferences convened in support of Army operational tests. C-17

In addition to the policy set forth in the enclosures, you are to develop a suitable training program for scoring conference chairpersons. This training program is to be mandatory.

Finally, it shall be our policy not to utilize as data collectors for operational tests any individual who is an employee of the contractor whose system is under test.

Request you promulgate the above policy guidance to the field by message and initiate action to incorporate this guidance in Army regulations pertaining to operational testing.

2 Encls

Walter W. Hollis  
Deputy Under Secretary of the Army  
(Operations Research)



DEPARTMENT OF THE ARMY  
UNITED STATES ARMY OPERATIONAL TEST AND EVALUATION AGENCY  
8600 COLUMBIA PIKE  
FALLS CHURCH, VIRGINIA 22041



CSTE-2A (71-3c)

MEMORANDUM FOR: Mr. Hollis, Deputy Under Secretary of the Army (OR)

SUBJECT: System Contractor Participation in Testing

1. You asked me to get back to you concerning OTEA's and TECOM's views on the issues involved in applying the restrictions contained in Public Law 100-80 on system contractor participation in testing.
2. Excluding contractors from scoring conferences, etc. (per attached message) is a good step for testing leading to full rate production. The policy is clear, enforceable, and should not create any problems. I have discussed this policy with MG Drenz and he is in general agreement as long as it is not applied to earlier testing. I suspect the USAF would also have problems here.
3. The public law does present some problems in the conduct of IOT&E testing in the area of logistics and maintenance support. For any major system where the system contractor is not an integral part of the maintenance or support strategy for the system deployed for combat, the costs necessary to create the military structure and logistics system to support the IOT&E would be prohibitive. These costs are in the form of dollars, training and time to create this support structure for a system that the Army may not ultimately procure.
4. The Army should seek some changes or waivers to the current public law that would allow (for cost effectiveness reasons) system contractors to provide specified types of logistics and maintenance support during the conduct of IOT&E. It seems prudent that the Army and Air Force work this issue together to ensure that DOD obtains a workable change that both services can live with.
5. I understand these issues may be referred to the Army Test and Evaluation Committee (ATEC) to come up with firm policy recommendations. The policy should be uniform across the services insofar as possible and we should be careful not to over react. The contractor is a valued member of the development team and his knowledge about the system is important to full understanding of the system's performance.
6. MG Drenz has concurred in this memo.

C-18

1 Enc

JEROME B. HILMES  
Major General, USA  
Commanding

CF:  
MG Drenz

APPENDIX D  
FACILITIES AND INSTRUMENTATION

SARD-RPP

Subject: Army Instrumentation Test Suites

Smart Munitions Test Suite (SMTS)

SMTS will provide instrumentation for tracking numerous small and maneuvering submunitions, near the ground, in clear air and through obscurants to collect performance data including pitch and yaw. Smart munitions include the SADARM family (8 in., 155mm, MLRS), MLRS TGW and ATCMS (Block II).

Operational Smoke Test Grid (OSTG)

The OSTG will provide instrumentation to conduct force-on-force maneuvers in a smoke/obscurant environment. This suite will be used for technical and operational tests to include those examining tactics, doctrine, model validation, tactical sensor system performance, etc. Thus, it will test both friendly and enemy smoke/obscurant munitions.

Stress Loading Facility (SLF)

The SLF will be a movable set of instrumentation to test the interoperability of communications, command and control and intelligence electronic warfare systems under realistic battlefield electromagnetic environments. The instrumentation will be modular to complement the fixed facility at the Electronic Providing Ground and will be transportable in trailers and vans to tactical test sites.

Funding Situation: None of the test suites are in the funded area for POM 90-94. Candidate systems will be identified and notified by September 1988. Funding costs are estimated to be:

(\$ MILLIONS)

<u>Test Suites</u>	<u>FY90</u>	<u>FY91</u>	<u>FY92</u>	<u>FY93</u>	<u>FY94</u>	<u>TOTAL</u>
CATES*	\$ 20.0	20.0	20.0	20.0	20.0	100.0
SMIS	9.0	23.0	16.0	14.0	8.0	70.0
OTSG	6.8	8.1	4.1	0.6	0.0	19.6
SLF	9.1	9.0	4.0	3.0	0.0	25.1
						\$214.7

\* CATES funds were constrained to \$100 M, total, with guidance to augment existing instrumentation within that limit.

Mr. Tyler/56512

D-2

## APPENDIX TO: FACILITIES AND INSTRUMENTATION

SARD-RPP  
9 March 1988

### Information Paper

SUBJECT: Army Instrumentation Test Suites

1. Purpose. To provide status information concerning the subject test suites to the Army Science Board panel reviewing test and evaluation.

2. Discussion.

a. Congressional reductions to institutional budget elements containing funds for replacing and modernizing test facility instrumentation were severe for FY86, 87 and 88. OSD reduced the FY89 accounts, accordingly, that were recently submitted to Congress.

b. Only selective improvement has occurred; consequently, test instrumentation modernization has not kept up with either the development of advanced technology systems or the threat that new weapon and support systems could face on the battlefield.

c. With the approval of the USofA, ASA(RDA), VCSA and Commander, AMC, it was determined that existing test instrumentation and that which will be acquired with institutional funds would be augmented in the most critically deficient areas by movable suites of test instrumentation. Such suites would be budgeted for by benefitting programs or whose derivative second generation programs could benefit.

e. A test suite is a collection of related instrumentation configured for technical and operational testing of new technology weapons, systems or initiatives in specific areas.

f. Four test suites are being planned, the concepts have been studied and some prototype instrumentation is being tested:

#### Counter Air Test and Evaluation Suite (CATES)

CATES is designed to provide a mixture of live and simulated targets and threat simulators to test and evaluate the performance of air defense systems. CATES will consist of a movable combination of fielded systems, C3I systems, threat simulators, instrumentation (e.g., radars) and data processing equipment. CATES will also be used to test Army aircraft.

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